- World's largest Yankee tissue machine
- Electrical distribution system at Bowaters
- Hemicelluloses – their effect on pulp quality
- Pulpwood tree plantation
- Results in plastic coatings

The Paper Industry

Let us put the SQUEEZE

ON HIGH EVAPORATING COSTS!

. . . and give you assured results, too!

From start to finish, Swenson offers much more than the equipment alone. You can get preliminary product research and testing in the Swenson laboratory . . . evaporators that are custom-engineered for your products . . . surveillance of operation and periodic checks after installation.

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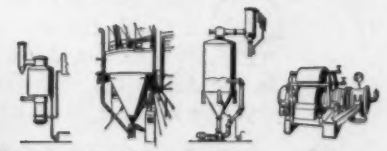
Proved Engineering for the Process Industries
SINCE 1889

A Division of WHITING Corporation


Evaporators Spray Dryers Crystallizers Filters

Modern ceramic ash tray of unique design, featuring the Yang-Yin symbol.

This symbol (Yang-Yin) represents T'ai-chi, the old Chinese *Ultimate Principle*, and as such, *perfection*. As the Asten-Hill trademark it symbolizes *perfection* in paper mill DRYER FELTS.

Name and trademark registered

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WHY A NORTHWEST MAKES A BETTER CRANE FOR THE PAPER MILL!

IT goes anywhere! It can unload a train of pulp from the side or end. It can unload traveling over the cars themselves. It can work its way into a pile or back out of a pile and with a HighLift Boom, reach either car, truck or storage without changing location and at the same time makes more storage space available.

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If you are doing your own cutting you will find your Northwest is a proved Log Loader and with a heeling boom it gives you a machine that can handle loading to trucks or decking.

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SIMPLICITY OF DESIGN
—for easy upkeep.

CAST STEEL BASES WITH CAST STEEL MACHINERY SIDE FRAMES
—eliminates weaving—assures the alignment of shafts and bearings and reduces wear.

"FEATHER-TOUCH" CLUTCH CONTROL
—easy operation—no shutdown because of control failure. No pumps or compressors.

CUSHION CLUTCH
—reduces overloads on parts under power when the tongs hang up.

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—eliminate the jerks and grabs that set a load to swinging.

BALL AND ROLLER BEARINGS ON ALL HIGH SPEED SHAFTS
—minimum power loss to friction.

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—boom up—boom down—no jumping, no chattering, just velvet action under power both up and down. Independent High-Speed Boom Hoist available if desired.

NORTHWEST DIFFERENTIAL STEERING
—positive traction on both crawlers while turning as well as when going straight ahead assures easy negotiation.

CRAWLER GEARS FULLY ENCLOSED
—nothing uncovered to pick up trash.

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The Crane That Goes Anywhere

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Nalco POLYPHOSPHATES

NALCO research in Polyphosphates has brought better control of cost and quality to many a mill.

Listed above, of course, are merely the big and broad applications of Nalco Polyphosphates.

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The Crane That Goes Anywhere

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 37 • NUMBER 11 • February 1956

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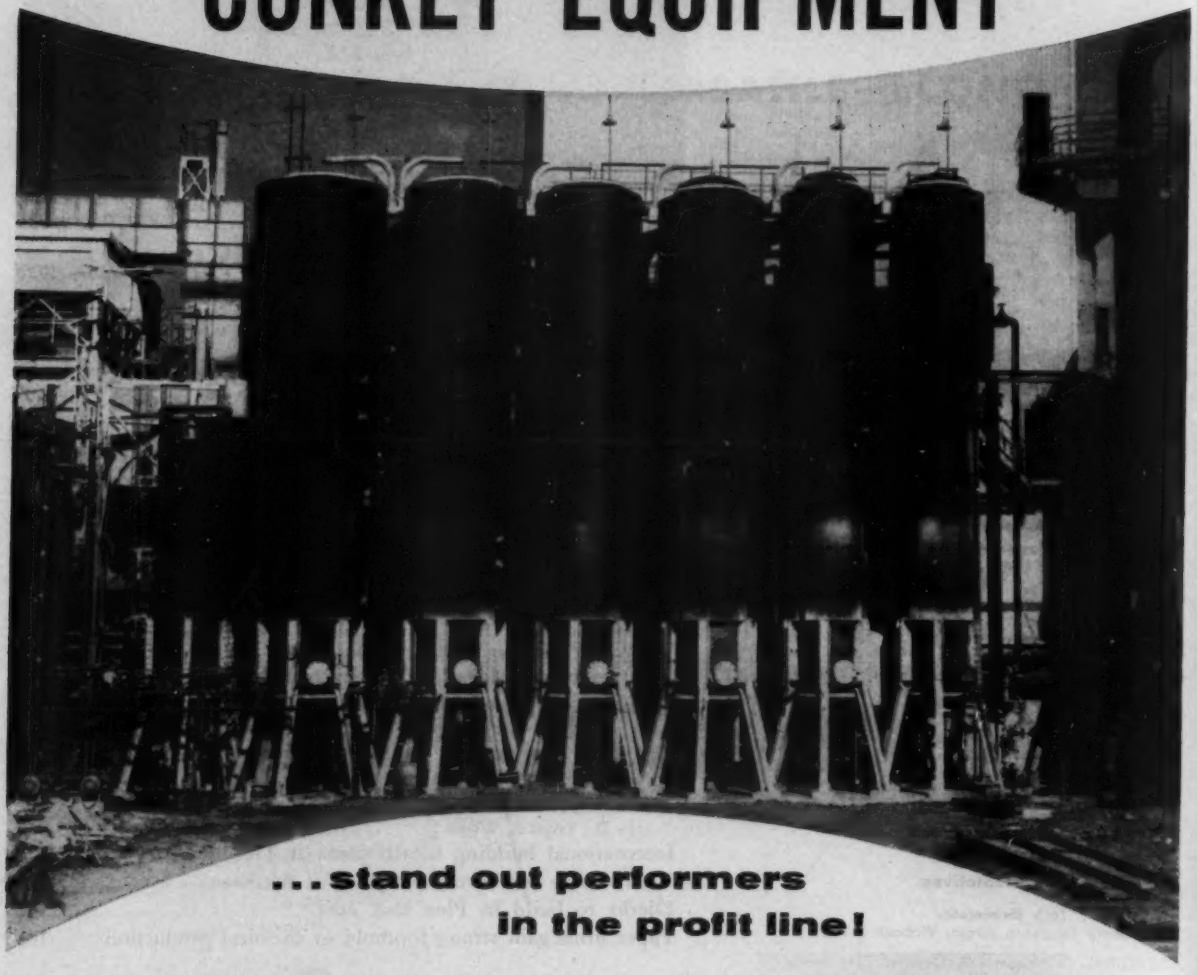
CONKEY EQUIPMENT



...stand out performers in the profit line!

Conkey evaporators, such as the sextuple effect evaporator above, are providing pulp and paper mill operators everywhere with proof of performance in profits . . . *economical evaporation records that stand out.*

Conkey evaporators are engineered for optimum usage and economical performance under all conditions of service. Chicago Bridge & Iron Company's four strategically located plants are completely equipped to meet the most exacting specifications of fabrication and erection.

Further information concerning Conkey equipment may be obtained by writing your nearest CB&I office.

Above: Conkey six body sextuple effect black liquor evaporator with vertical surface condenser.

CHICAGO BRIDGE & IRON COMPANY

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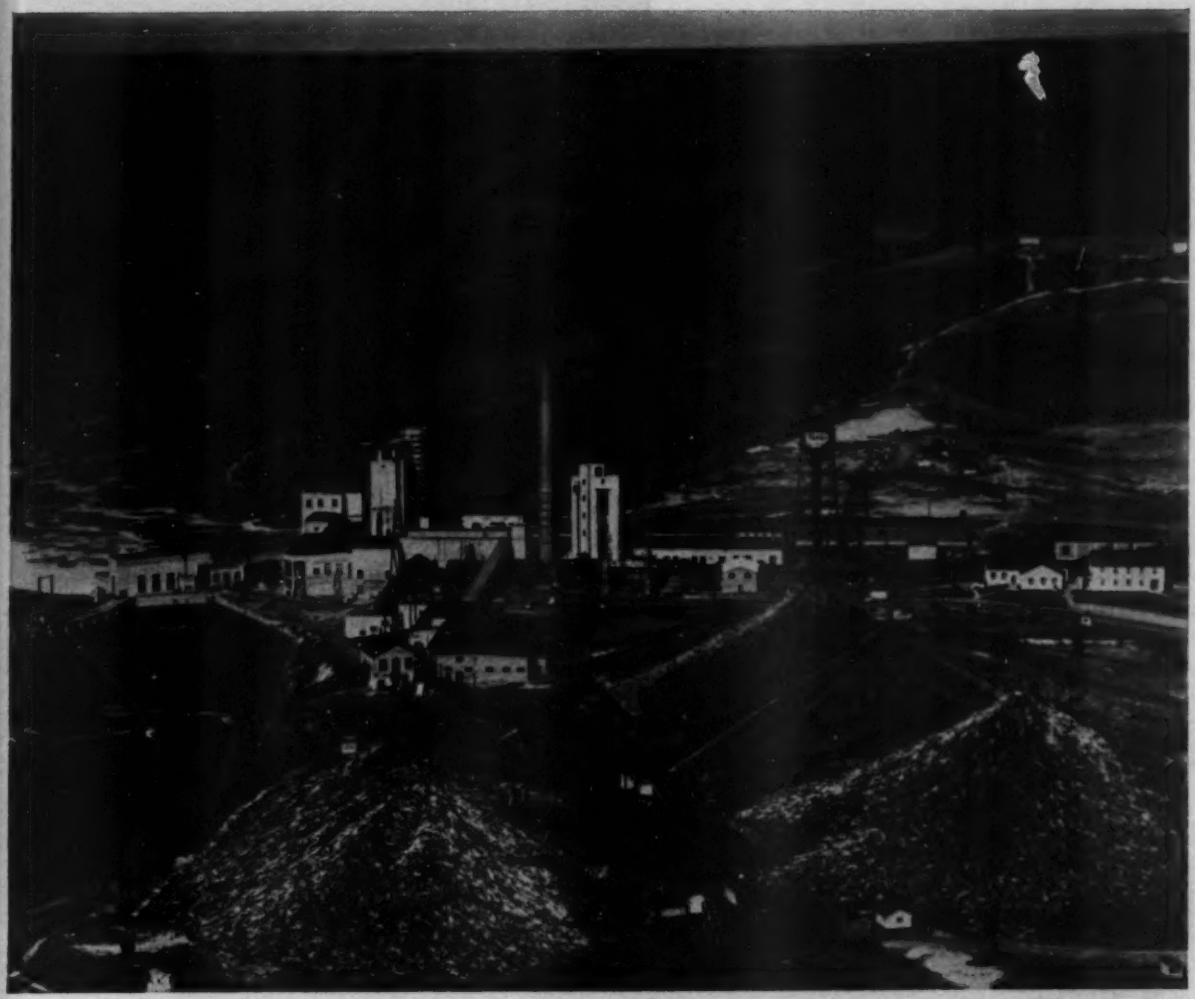

(Aerial view Abitibi Mill, Smooth Rock Falls, Ontario)

MEAD GIVES YOU THE QUALITY OF PULP YOU NEED

Mead has the quality pulps to fit your needs, whether chemical or mechanical, from hardwoods or soft woods, bleached or unbleached. These come from such a wide geographical range as Ontario, British Columbia, New Brunswick, Georgia, Tennessee, Maine and Wisconsin.

Abitibi Bleached Sulphite

Produced from the matchless characteristics of Canadian Black Swamp Spruce, for more than a quarter of a century Abitibi Bleached Sulphite has successfully answered the requirements of leading manufacturers of tissue, white papers and board. Outstanding for cleanliness, printability and strength, Abitibi Pulp is also known for its brightness, workability, and rapid development to maximum Mullen.

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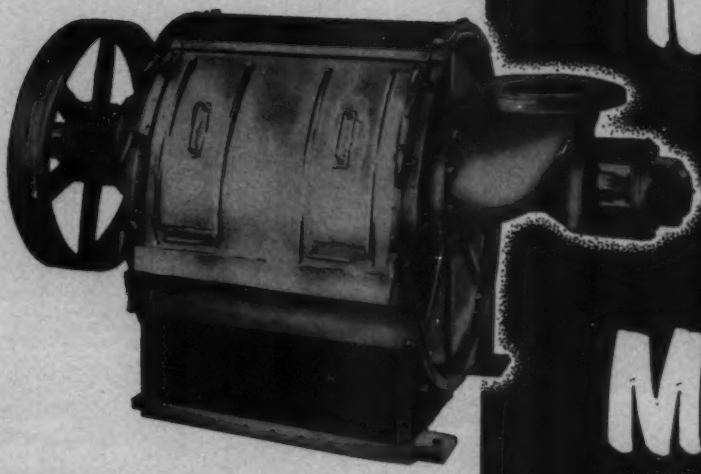
118 WEST FIRST STREET, DAYTON 2

MEAD *pulp*



The "Junior" Screen . . . smallest of *three* units producing from 35 to 150 tons per day, respectively.

Money Saving Midgets

Cowan Centrifugal Pulp Screens by
APPLETON MACHINE COMPANY

Added efficiency, greater economy are the watchwords for *Appleton Machine Company's* junior versions of the standard Mark "A" Cowan Centrifugal Pulp Screen, acknowledged as outstanding in its field.

The Mark "E" Screen is a half-sized model of the standard Mark "A", conservatively rated at a capacity of 2400 U.S.G.P.M. accepted stock. 50 h.p. is required to operate the Mark "E", but its drive is designed to accommodate a 60 h.p. motor, wherever needed. The Mark "E" is particularly advantageous in smaller mills, or as a supplementary screening unit. Also, installing two Mark "E" Screens—instead of a single larger machine—provides a definite safety factor in case of breakdown.

The "Junior" Screen is a quarter-sized model of the big Mark "A", with a rated capacity of 1400 U.S.G.P.M. accepted stock. 25 h.p. operates the "Junior" Screen, but it will handle motors up to 40 h.p. Greatest applications are as secondary screening units, and as a primary screen for mills producing a variety of pulp grades which require a system made up of small, separate units.

Performance of these two Cowan Screens is comparable in every way to that of the standard Mark "A" Screen . . . the same high consistency screening . . . low percent rejects . . . good fiber separation . . . low shower dilution pressure . . . top hydraulic efficiency. Typically sound *Appleton Machine* construction plus a protective coating tailored to fit your needs *complete* your assurance of long-time satisfaction.

CUSTOM-BUILDERS OF PULP & PAPER MILL MACHINES
WINDERS • FINISHING ROLLS • REWINDERS

ENGINEERING

RESEARCH

There are Qualities *Behind* ANNIN VALVES you'll never find in imitations

QUALITY CONTROL

EXPERIENCE

ANNIN DEVELOPED AND INTRODUCED:

SPLIT BODY

The Annin split-body design has given Industry new standards in control valve construction: lower body pressure loss, greatly reduced erosion, greater rangeability, longer life and reduced maintenance.

DOMOTOR OPERATOR

Out-performs all other pneumatic valve actuators. They are the highest speed, most powerful, and provide the best response characteristics. Long strokes assure that all size valves are truly hi-lift control valves.

TEFLON SEAT SEAL

The teflon seat seal for absolute tight closure, teflon guide bushing to eliminate guide clearance, and teflon V-ring packing for reliable stuffing-box performance were developed and introduced by Annin.

DOOLSEAL

Providing a new high in stuffing-box practice, the Doolseal, originally developed and introduced by Annin, assures reliable seal for hard-to-handle or toxic chemicals without resorting to mechanical seals.

...and many others!

CUT INVENTORY 50% WITH

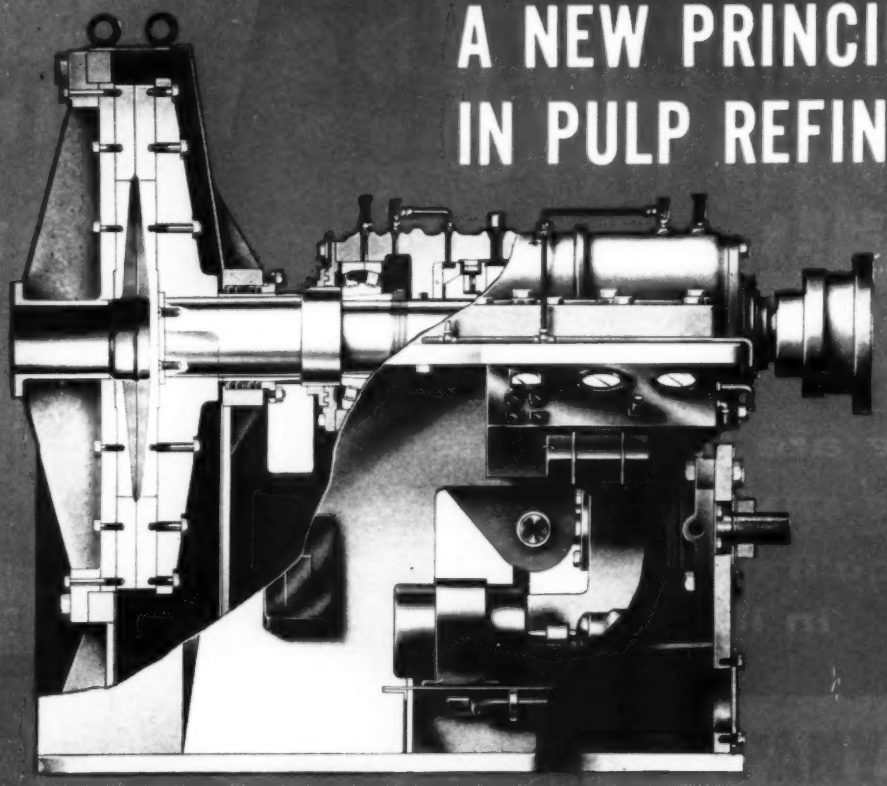
ANNIN

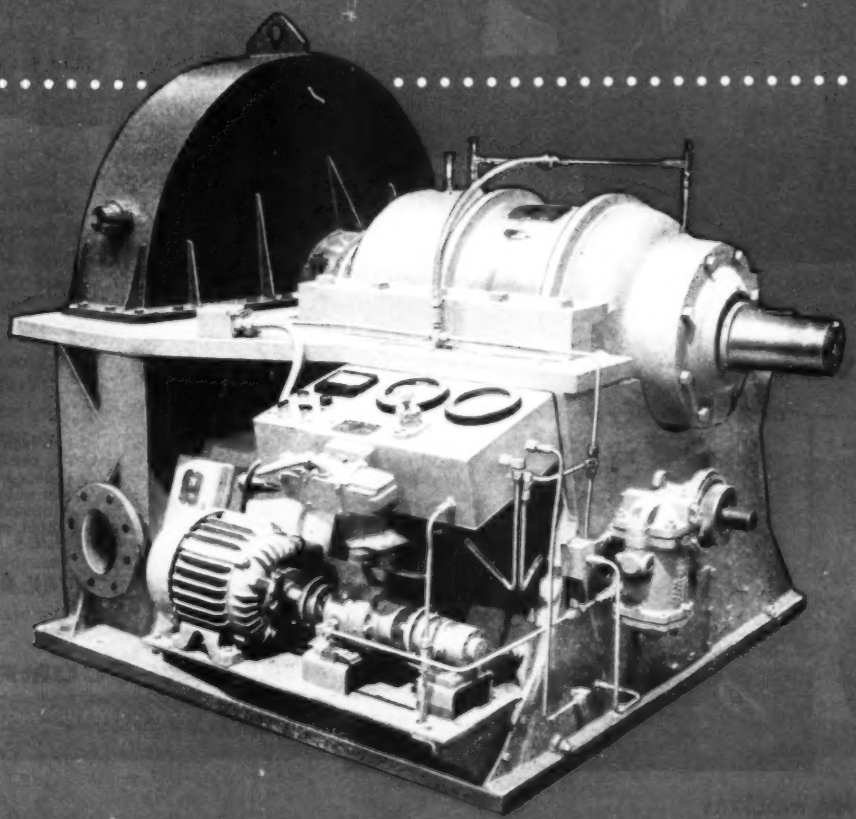
Control VALVES

THE ANNIN COMPANY
6570 East Telegraph Road
Los Angeles 22, California

The SUTHERLAND Balanced Flow Refiner*

A NEW PRINCIPLE IN PULP REFINING





The Sutherland balanced flow refiner* regulates the flow of pulp between refining elements. The balanced flow principle is entirely independent of capacity or pressure.

Previous to development of the Sutherland Refiner, control of flow through continuous refiners was primarily obtained by throttling the discharge of the unit. In some instances the supply of pulp was regulated at the refiner inlet. With the advent of the Sutherland Refiner in the 1930s flow control was exercised at the discharge from the disks with an additional control at the pulp inlet. In each of the above cases capacity or flow rate could also be controlled, to a lesser extent, by changing the power load—usually in conjunction with changes in one or more of the controls mentioned previously. Such a change usually altered both the capacity and the work done on the pulp. Frequently the latter was not desired.

However, in the Sutherland Balanced Flow Refiner throughput is controlled in a unique manner as a function of the coaction of the forces imposed by adjustment of the above operational variables. This is accomplished by incorporating the new Sutherland hydraulic control system which continuously maintains the refining action in a balanced state by providing the exact force required to offset the thrust loads created by the flow of pulp suspension through the unit. Consequently the refiner responds automatically to minor changes in pulp supply conditions and maintains a constant uniform refining action until the operator readjusts the controls.

Sutherland's long and successful experience in disk design has culminated in a completely new and improved disk which has shown remarkable performance characteristics in mill trials. Capacity of the new disk has been nearly double that of an older disk, on the same service. The power required has been almost halved and, despite increased capacity, disk life has materially improved.

The unique combination of a refiner designed on the balanced flow principle with disks based on a new principle of design has resulted in greatly improved refiner operation and sets new performance standards for stock preparation equipment.

Note These Advantages:

1. controlled flow at the only point where control is vital—between the disks—an exclusive with Sutherland
2. accurate control of capacity for quality production
3. quick and simple refiner adjustment
4. rugged construction for continuous, heavy-duty operation
5. compact construction and light weight
6. lower power consumption
7. efficient use of horsepower
8. lower initial investment cost
9. low installation cost
10. lower maintenance costs
11. easily remachinable disks; disk changes are quick and require no major disassembly
12. only one packing gland and it is readily accessible; no hidden packings anywhere to make for costly maintenance
13. all parts readily accessible
14. complete flexibility in installation and operation
15. single rotating disk minimizes uneven wear, both the power and the work are distributed uniformly over the disk
16. consistent stock quality is maintained by the constant pressure applied on the pulp by the hydraulic system and fluctuations in consistency or pulp quality are minimized—more uniform quality of pulp results

DESIGN PRINCIPLE: The single rotating disk operating against a single stationary disk offers the best opportunities for precision design and improvement of pulp quality and so was selected as the best means to develop the new balanced flow principle. Problems of pressure differentials and uneven wear common in multi-disk refiners are eliminated. Since multi-disk refiners do not distribute the power or work uniformly over the disk there is no way of knowing how or where power is being consumed or work done. The result is uneven disk wear usually resulting in rapid replacement, high maintenance costs, and long periods of down-time. Uneven wear can result in plugging the unit and usually prevents the reproduceability of results. By contrast, the single rotating disk, with its single adjustment, allows the operator to know exactly how much power the disk is pulling and exactly where that power is being used.

PULP QUALITY. Experience gained from the design, production, and operation of more than 600 disk refiners has made the new Sutherland balanced flow refiner the ultimate in the refining of quality paper pulp.

*Patents Pending

SUTHERLAND

REFINER CORPORATION
TRENTON 8, NEW JERSEY

MANUFACTURED BY VALLEY IRON WORKS CO., APPLETON, WISCONSIN

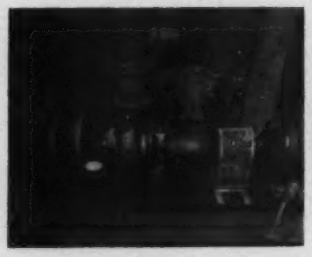
See how the new I-R Stock Pump

PREVENTS VAPOR BINDING

on the toughest paper mill jobs

6% STOCK WITH 30% AIR

The size 6EL pump shown here handles 6% stock containing an estimated 30% air. Before this pump was installed, air binding difficulties were frequently encountered. Now stock flows freely and continuously, with no costly shut-downs from air binding.



Radically new centrifugal pump succeeds where all others have failed*

7% BLEACHED AND WASHED SODA PULP

Before this 1200 gpm pump was installed, it was necessary to dilute the stock to about 2.4% before it could be pumped from the storage chest to the beater without air binding. Now stock with a consistency of 7% is easily handled.

CAPACITIES:
200 to 7000 gpm

HEADS:
5 to 225 ft.

8% BONE DRY GROUNDWOOD STOCK

This size 6EM pump handles 8% "bone dry" groundwood stock without clogging or air binding. Prior to the installation of this unit, the maximum concentration that could be pumped was 5%.

*Patented construction with unique *diverging* impeller makes Ingersoll-Rand Class EL, EM and EH Stock Pumps nonclogging, non-vapor-binding, self-venting and self-regulating. Treated, sized or foamy stock with up to 50% entrained air can be pumped without vapor binding or losing prime. And consistencies as high as 10% can be handled without clogging. For complete information on this revolutionary new pump, send today for Bulletin No. 7325.

10-317

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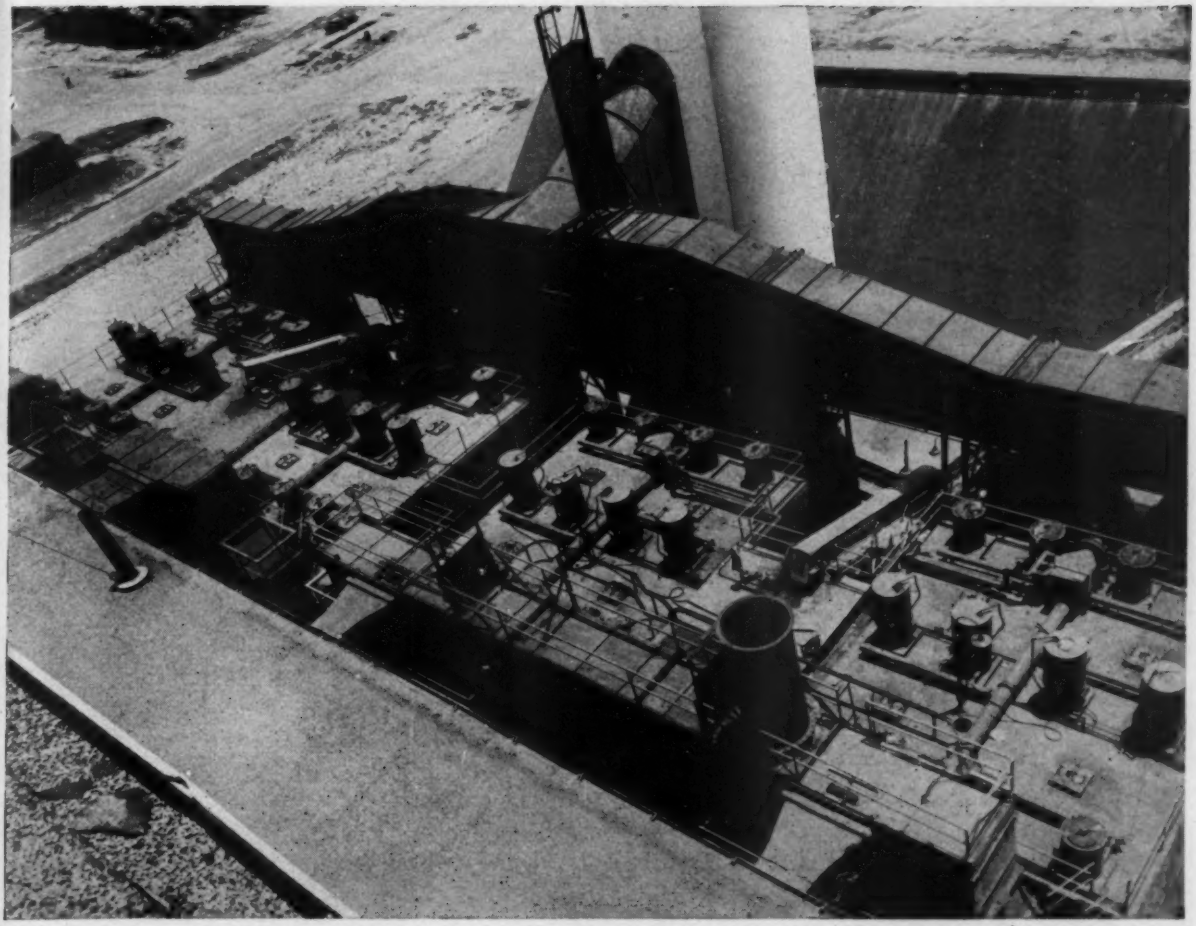
11 Broadway, New York 4, N.Y.

PUMPS • COMPRESSORS • VACUUM EQUIPMENT • GAS AND DIESEL ENGINES • AIR AND ELECTRIC TOOLS • ROCK DRILLS



International Paper Co. gets high-efficiency recovery of valuable solids . . . with Koppers Electrostatic Precipitator

In its Natchez Kraft mill, International has two Koppers black-liquor precipitator installations. Both of these (one completed in 1950, the other in 1952) consist of two double-chamber, tile-shell, scraper-bottom black-liquor units.

In addition, International has a similar installation at its Panama City, Florida, mill. All show high-efficiency recovery of valuable chemicals. Recently, International awarded Koppers an order for a new precipitator installation for its Bastrop, Louisiana, mill.

Over the years, performance records established by Koppers Precipitators have merited industry-wide confidence. And such confidence is well placed. Koppers Engineering "know-how," its extensive research facilities, its experience in problem analysis . . . all make for satisfactory service. Of course, every gas-cleaning problem is different and requires its own individual analysis and solution. Keep Koppers' ability to serve you in mind. Call on Koppers when you need assistance. The coupon below is for your convenience.

KOPPERS®

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE 3, MD. This Koppers Division also supplies industry with Fast's Couplings, American Hammered Industrial Piston and Sealing Rings, Aeromaster Fans, Gas Apparatus.

Engineered Products Sold with Service

ELECTROSTATIC PRECIPITATORS

KOPPERS COMPANY, INC., *Electrostatic Precipitator Dept.*, 4602 Scott St., Baltimore 3, Md.

Gentlemen: I am interested in a review of my gas cleaning problem.

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Company.....

Address.....

City..... Zone..... State.....

Albemarle turns out high-standard Kraft Papers, Blotting and Absorbent Specialties, and Specialty Kraft Boards—natural and colored, plain and printed. Manufacturers throughout the country know and value the extra sales appeal of Albemarle's versatile, colorful, tough Kraft packaging.

HAM FELTZ says: "The manufacture of tough papers and boards for standard and specialty purposes demands good felts; and Albemarle, like other top-quality papermakers, has long known that Hamilton Felts drink up water fast and uniformly . . . reduce drying-roll requirements and produce high tonnage with maximum natural-fibre strength."

Hamilton Felts come in more than 300 types for producing every type of paper from heaviest boards to thinnest tissues.

Hamilton Felts

MIAMI WOOLEN MILLS

Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Now Available to the Paper Industry —the First Air-Powered Strapping Machine that Tensions, Seals and Cuts Steel Strapping

OUTSTANDING FEATURES

- Air power does the hard work—fast
- Tension is just right every time
- Field-tested dependability
- Light weight, portable

For ⅜" and ¾" Signode strapping; automatic seal-feed magazine holds 75 seals; tension adjustable to 1600 pounds.

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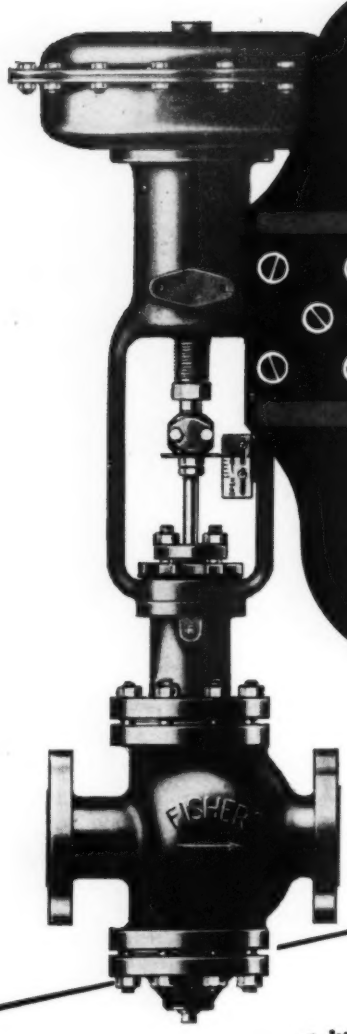
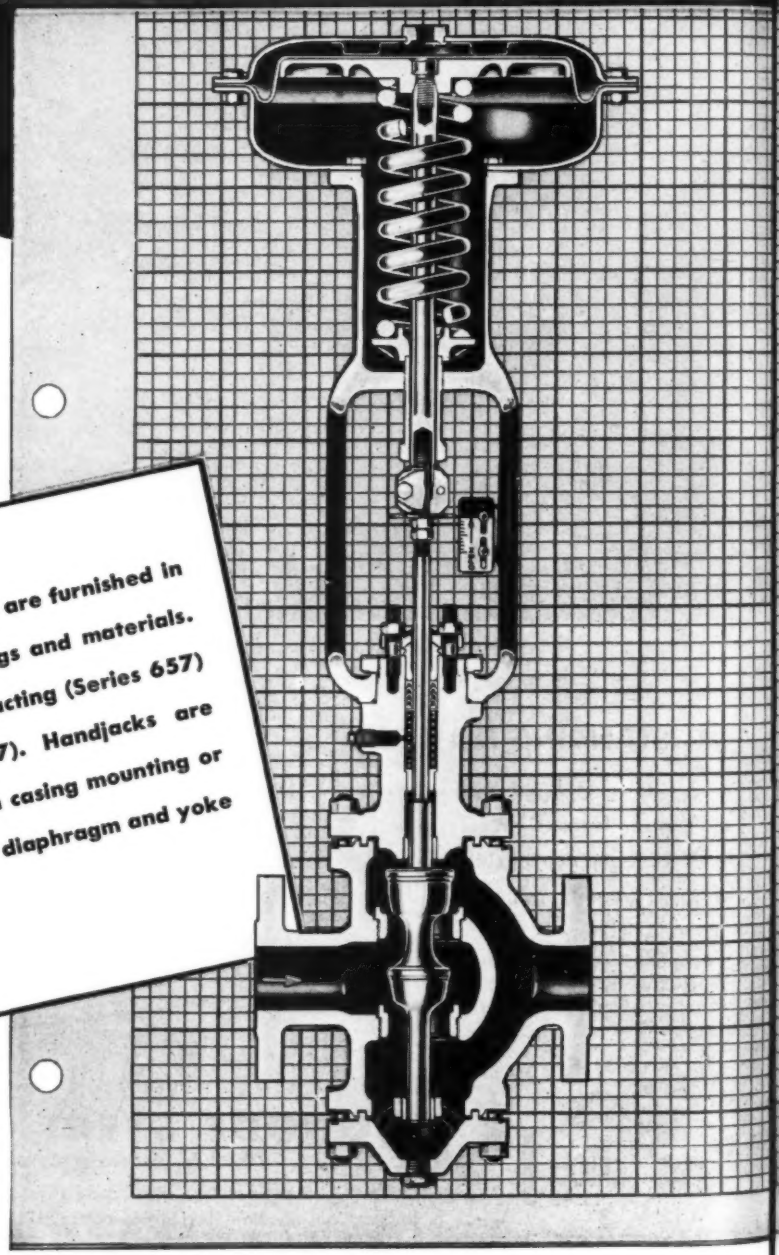
FISHER®

DIAPHRAGM





● Fisher Diaphragm Motor Valves are furnished in a wide variety of pressure ratings and materials. Topworks may be either direct acting (Series 657) or reverse acting (Series 667). Handjacks are available for either diaphragm casing mounting or yoke mounting. There are six diaphragm and yoke size combinations.

Improved

MOTOR VALVES

Improved PERFORMANCE FEATURES

- Bolted-clamp type stem connection allows stem adjustment of 50% of total travel. Can be disconnected in the field without stem damage. Will not shake loose from vibration or rotational inner valve forces.

- Rugged body to yoke connection with hammer lug nut. Topwork can be removed without disturbing stuffing box.

- Specially designed Buna N molded diaphragms with Nylon insert retain superior flexibility at low ambient operating temperatures. Provides linearity between operating pressure signal and travel, and gives maximum effective area.

- Bolted gland stuffing box with Teflon packing.

- Stainless steel clear view travel indicator.

- Spring ranges: 3 to 15 psi; 6 to 30 psi.

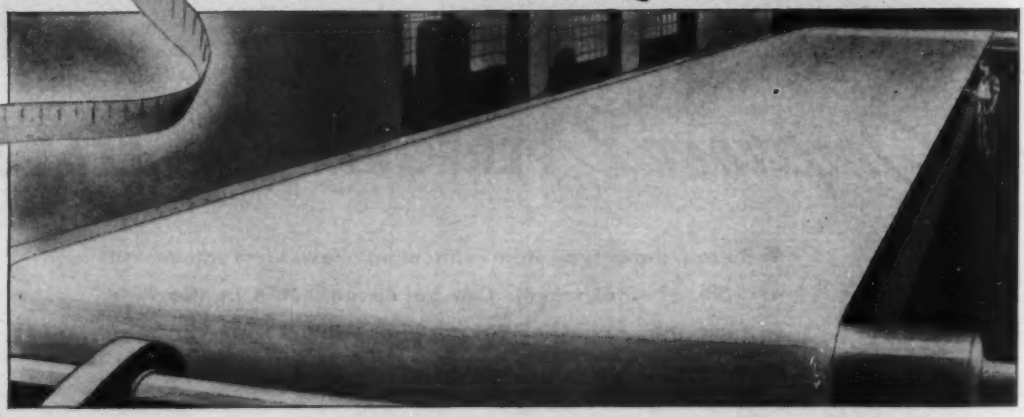
FISHER GOVERNOR COMPANY • Marshalltown, Iowa

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

FISHER

Since 1880

What's the Average in making FELTS?



A bottom felt, 224 inches wide, on the new 320-inch king-size dryer at the Starkville Mill. When finished, this TENAX FELT will weigh nearly 1,000 lbs.

The smallest TENAX FELT . . . a baby 13-pounder for a specialty mill . . . is weighed in preparation for shipment to its destination.

Actually, there's no such thing as an *average* TENAX FELT . . . either in size or specifications. Each felt is designed, woven and finished to rigidly pre-engineered, pre-calculated specifications. Each is created for its own special job on a certain papermaking machine.

An *average* day at the Newfane or Starkville Plants might bring orders for felts ranging from a tiny 13-pounder to a giant felt weighing nearly half a ton, capable of clothing the largest paper machine in service today. ***Lockport takes them all in stride.***

TENAX FELTS

Serving the Paper Makers Since 1891

LOCKPORT FELT COMPANY

NEWFANE, N.Y. STARKVILLE, MISS.

best convertible on paper

Clinton® enzyme conversion starch

Clinton's "convertible" starches, 3011 and 3021, convert uniformly to give you desired penetration . . . increased strength . . . better printing surface. And, since 3011 and 3021 convert well at high solids levels, they give efficient coating . . . from application to drying.

No wonder so many leading papermakers use Clinton enzyme conversion starches. They convert prospects to customers!

. . . *and remember* technical service in connection with your specific problems is available upon request.

Quality products

FROM THE WORLD'S CORN CENTER

CLINTON

CLINTON FOODS INC.
Corn Processing Division
CLINTON, IOWA

LIGHT TOUCH

CLEAN ROLLS

LODDING DOCTOR

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LODDING ENGINEERING CORPORATION · Worcester, Mass.

helping you is our aim

Getting more paper off the machines—without compromising quality— is the challenge facing many mill operating people today. It's a tough job, but your customers' growing requirements must somehow be met.

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A working partner with the paper industry for many years, we offer our resources to help make your tough job a little easier . . . intelligent field representation—competent research facilities—experienced design service—modern felt-making machines—and the devoted skill of our craftsmen.

FATHER AND SON TEAM—*It takes more than our modern, precision machines to make felts you can depend on. It takes men and machines . . . craftsmen like Frank and Harold Drexler whose combined 75 years of felt-making experience and devoted skill pay off for you on the paper machine.*

Appleton felts

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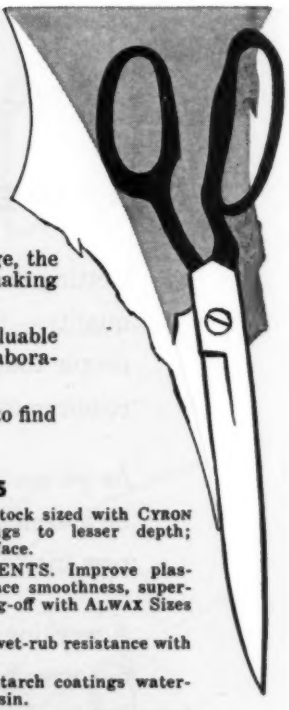
APPLETON WOOLEN MILLS

a working partner with the paper industry

APPLETON, WISCONSIN

Here's where to look for help on Papermaking Problems!



If you're looking for answers to any of the papermaking problems listed on this page, the best place to find them is at Cyanamid where we handle the broadest line of papermaking chemicals in the industry.

Our Technical Service Staff, trained in every phase of papermaking, can be of valuable help. If they can't give you an immediate answer to your problem, our Research Laboratory or Application Laboratory is available for assistance.

Just run down the list below, and tick off your problems—we'll make it our problem to find the right answer for you.

SIZING

( ) BRIGHTNESS. Where color is important, Cyanamid offers the lightest grades available anywhere in ACCOBRITE® Rosin Size (X, WG).

( ) COLOR STABILITY. ACCOBRITE shows less degradation on aging than other sizes.

( ) DUSTING. Use low-dusting ACCOBRITE dry, or use liquid sizes (save on handling, too).

( ) COST. There's economy in CYFOR® Fortified Rosin Size (35-45% less required); or in unbleached grades use FF and Dark Wood Rosin Sizes.

( ) FOAM. Use non-foaming ACCOBRITE (zero foam index), low-foaming CYFOR or FF Sizes. Or check foam with CYNOL® Defoamers.

( ) HIGH SIZE SPECS. Boost hard size specifications with CYFOR Fortified Rosin Size (lower cost, too).

( ) ACID AND ALKALI RESISTANCE. Especially effective beater additive is CYRON® Size (needs no alum, rosin or wax). Surface size with CYRON and starch for high ink and lactic acid resistance.

( ) WATER, LACTIC ACID. 25 grades ALWAX® and WAXINE* Sizes to improve resistance to water, writing or printing inks, varnishes and lactic acid. AEROSIZE® Sizes (high free rosin) boost water resistance.

( ) FINE PAPER SIZING. When sizing fine papers use iron-free Alum for highest brightness. Improve surface with CYRON, ALWAX or WAXINE. Reduce pick and curl with PAREZ® 607 Resin.

CYANAMID

AMERICAN CYANAMID COMPANY
PAPER CHEMICALS DEPARTMENT
30 Rockefeller Plaza, New York 20, N. Y.

Please have your Technical Representative call on the problems checked above.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

In Canada: North American Cyanamid Limited, Toronto and Montreal

COATINGS

( ) RAW STOCK. Coating raw stock sized with CYRON takes more uniform coatings to lesser depth; smoother, better printing surface.

( ) CLAY AND OTHER PIGMENTS. Improve plasticity, water resistance, surface smoothness, supercalendering and reduce dusting-off with ALWAX Sizes in clay-pigment coatings.

( ) PROTEIN-PIGMENT. Raise wet-rub resistance with PAREZ 613 Resin.

( ) STARCH COATING. Make starch coatings waterproof by adding PAREZ 608 Resin.

( ) STARCH PIGMENT. Coatings take on higher wet-rub resistance when treated with PAREZ 608 or 612.

( ) COATING ADHESIVES. Control viscosity and fluidify adhesives with AZITE® 900 Liquefier. Also use AZITE to preserve paper strength.

WET STRENGTH AND OTHERS

( ) WET STRENGTH. Highest wet strength, developed right off the reel, is imparted by PAREZ 607 Resin, a MELOSTRENGTH® Resin. Lower degrees of wet strength secured with urea-formaldehyde resins.

( ) COLOR RETENTION. Better dispersion of pigments and fillers, and better retention of color, secured with ACCOCEL® 741 Dispersant.

( ) LINTING. Linting of wiping papers, towels, tissues and napkins is reduced by use of PAREZ 607 Resin.

( ) ABSORBENCY. Improve water-absorbency of toweling, napkins, or tissues with CYNOL Rewetting Agents — surface or slush-stock application.

( ) PICK. Reduce pick in printing papers by treating with PAREZ 607 Resin.

( ) CURL. Curl in paper can be effectively controlled by addition of ALWAX or WAXINE Sizes or PAREZ 607 Resin.

( ) SOFTNESS. Permanent softness of tissue, absorbent papers imparted by CYNOL Softening Agents.

( ) BROKE. We have a lot of experience with wet-strength broke recovery that can be applied to problems you may encounter.

( ) CHEMICAL HANDLING. Use of liquid Alum and rosin size will simplify mill handling and may greatly reduce chemical costs.

( ) PITCH. Disperse with ACCOCEL® 741 Dispersant. Also effective in dispersion of ink, asphalt and other foreign matter.

( ) FILLER, FIBER RETENTION. Good retention of filler and fiber is promoted by the use of Sodium Phospho Aluminate.

*Trade-mark
®Registered trade-mark

you name it

We can't begin to cover all the possible problems in this space. If you have any special ones not mentioned that we can help with, note them here.

( ) _____

CURRENT COMMENTS

A hedge against contraction . . . the merger trend . . . and price fixing

Enlargement of foreign markets and the conservation of manufacturing and selling expense are twin backlogs being piled up by many American paper companies as a hedge against some possible future contraction of consumer demand. On the one hand, the merger trend, by which large companies are taking over converter establishments, is continuing. On the other, recent months have seen a rising tide of U. S. investment in paper production in Latin America as a substitute for the export selling of American-made papers.

As a related factor, there has been a trend on the part of the corporations not based on papermaking to add paper mills to their unrelated operations; such as the purchase by Standard Ore & Alloys Corp. of the historic J. & J. Rogers Co. mill in northern New York and the purchase by Thor Corp. of papermaking facilities in Michigan.

In the merger field, St. Regis Paper Co. has continued its expansion by acquiring Gummed Praducts Co. of Troy, Ohio, and Ajax Box Co. of Chicago as additions to its already wide-flung network of converter mills. And the trend is not only in the merger field. Union Bag & Paper Corp., hitherto an outstanding kraft producer, and Robert Gair Co. Inc., a leader in the paper container field, are said to be considering entering the newsprint field in the South.

A drive for diversification

The expansion south of the border, however, is most notable. This might be considered as a drive to increase foreign business and as a move to diversify operations. Just as Kimberly-Clark Corp. recently acquired a substantial interest in two Mexican paper mills, Scott Paper Co. has acquired an interest in Compania Industrial de San Cristobal, S. A., of Mexico City. This transaction is expected to be followed by other deals in this area. Apparently the demand for sanitary tissues in Latin America is growing, for Kimberly-Clark is at least partially in this field, which is far from monopolized by Scott. Further, Richmond Pulp & Paper Co. of Canada Ltd., hitherto principally a newsprint producer, has acquired stock in Papeles de Venezolanos, C. A., a sanitary tissue producer in Caracas, Venezuela.

West Viriginia Pulp & Paper Co., basically a book paper producer but manufacturer of many other major grades such as kraft liner, has not only brought Hinde & Dauch Paper Co., an important carton manufacturer, into its corporate structure, but has also moved south by setting up a Brazilian subsidiary in the shipping container field, known as Rigesa, S. A., at Valinhos, State of Sao Paulo. Here again, West Virginia faces potential competition inasmuch as Container Corp. of America, one of the largest container manufacturers, is reported to be considering the building of a plant somewhere in Latin America or the acquisition of an existing mill.

Scott is also involved both in domestic mergers and in foreign expansion. In addition to spreading its operations to the south, it has gone northward by contracting for 1,000,000 shares of British Columbia Forest Products Ltd. at $15 a share.

As yet, International Paper Co. with its enormous interests in Canada has shown no trend toward expansion beyond the southern borders of this country.

The movement southward has not been confined to the major American producers. The W. R. Grace banking and steamship interests have already moved into the Peruvian field with well-planned mills to utilize bagasse as a paper and paperboard raw material. Some of the product has even found its way north. Also, one of the big American distributing houses has aligned itself with British financiers for the development of a Brazilian industry to supply that country's own paper and paperboard requirements.

A high degree of flexibility

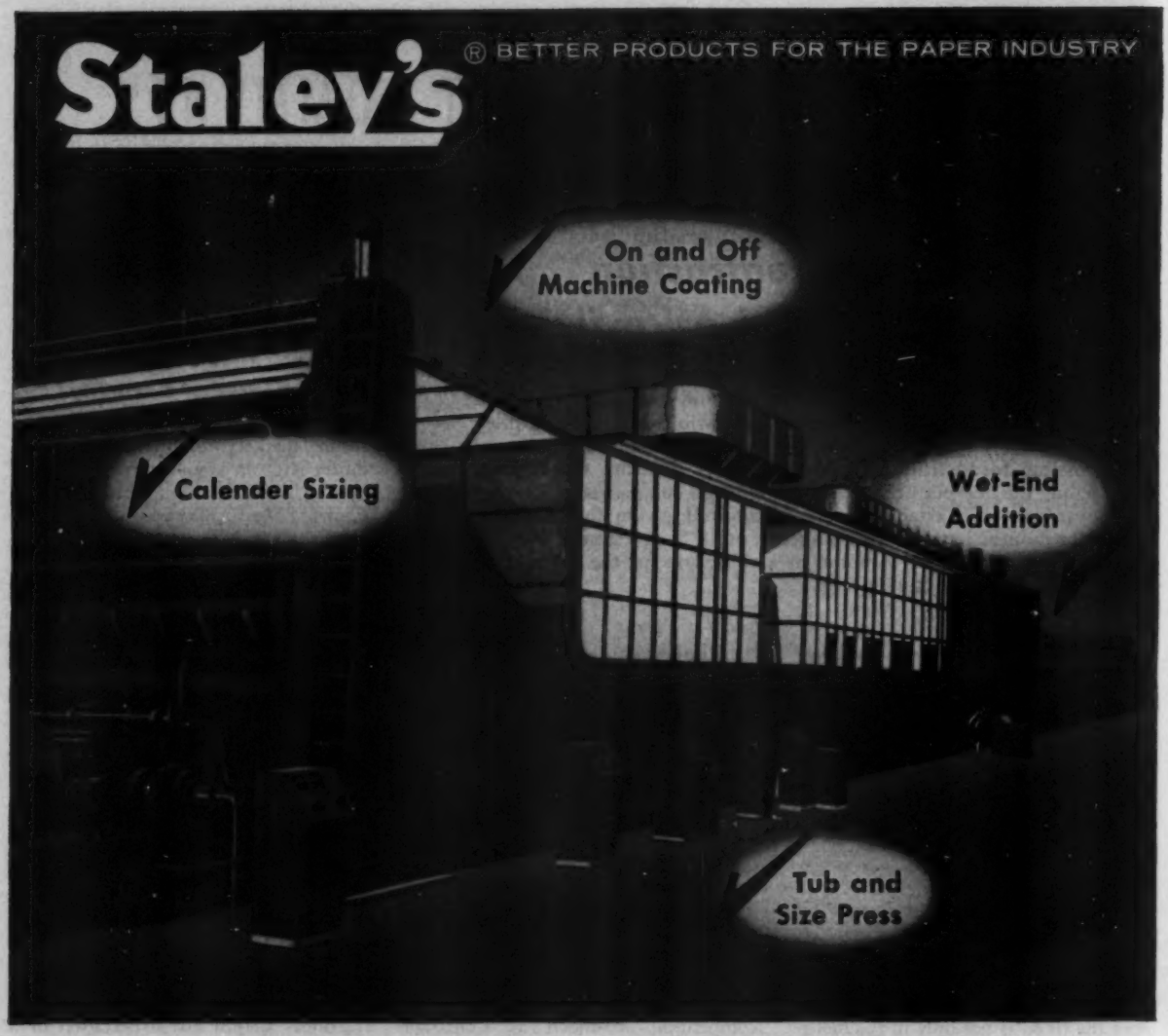
Another slant at the problem of future markets for the domestic industry is given in an interview granted by J. D. Zellerbach, president of Crown Zellerbach Corp., at San Francisco, in which he says that while his company expects the business picture to remain favorable, he does not intend to coast along on the wave of a "sellers market." As indicated by the merger of Gaylord Container Corp. into the Crown Zellerbach corporate structure, Mr. Zellerbach was planning to adjust with a high degree of flexibility to changing conditions which are bound to arise in a more competitive business environment.

Slightly under 30,000,000

Final figures for 1955 production show that the output of paper and paperboard was only slightly under 30,000,000 tons, an increase of approximately 11 per cent over the previous high year, 1954. Caution has been expressed by outstanding manufacturers against any expectation of a similar increase, percentage-wise, in 1956 over 1955. Any increase is likely to be closer to 5 per cent above 1955. With added capacity coming into the market during the coming year, the stage is set for dangerous inventory accumulation if there is any slackening of sales. Inventory swings, according to Mr. Zellerbach, can be troublesome. In other words, the industry is facing a year in which enthusiasm should be tempered with caution.

From sugar to cement

While Congress is threatening to do something about a feared abnormal growth-by-merger of existing major corporations, the Administration has moved against a segment of the industry in another area. The Federal Trade Commission has charged 21 manufacturers of multiwall paper bags with price fixing. The field is that of bags used for dry bulk packaging from sugar to cement. Among the companies cited are St.



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Current comments . . .

Regis, International, National Container Corp., Albemarle Paper Mfg. Co., and Union Bag & Paper. According to the charge, the companies used an identical formula to determine the final delivered cost to customers.

Somewhat higher prices

As the new year opens, a concise summary shows somewhat higher prices for almost all grades, short supply, and in some grades—especially newsprint—a rationing of deliveries to publishers and other users. The increased price for newsprint appears to be more or less uniformly $4 per ton. In fixing this price to its customers, Coosa River Newsprint Co. said the delivered price is lower than the buyers could secure from other sources. This increase is not a cause of worry, however, for Coosa River is controlled by the publishers who buy its output.

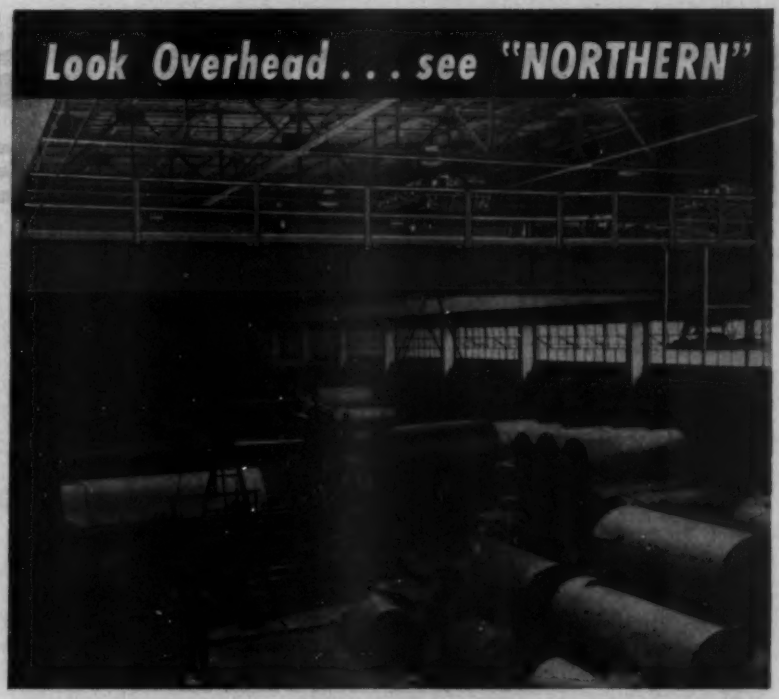
Stock and Bond Quotations

New York Stock Exchange — Stocks		
Closing Prices	Jan. 10, 1956	Dec. 9, 1955
A. P. W.	*4½-4¾	4⅜
Celotex	34⅜	35½
Same Pref.	19⅜	19½
Certain-Teed	24⅜	23¼
Champion P & F	60	64½
Same Pref.	*104½-105½	105
Chesapeake Corp.	*66¼-67¼	69¼
Container Corp.	74¾	71
Same Pref.	*104-105	103½
Crown Zellerbach	56½	56
Same Pref.	*102¾-103¾	103
Dixie Cup	55½	57½
Eastern Corp.	29⅛	30⅛
Federal Paper Board	31¼	32
Robert Gair	23¼	29¾
Same Pref.	107¾	109¼
Great Northern	95¾	92
Hammermill	37⅛	36
International	112½	113¼
Same Pref.	*103-104	104½
Kimberly-Clark	45⅛	46⅛
MacAndrews & Forbes	48½	50⅛
Marathon	33⅛	33¾
Masonite	36⅜	37⅞
Mead Corp.	70	68⅜
Same Pref.	*102-102¾	103
Same Sec. Pref.	*78-82	77½
Minnesota & Ontario	66½	70⅞
National Container	22	21¾
Same Pref.	38¼	38
Oxford Paper	36½	38¼
Same Pref.	101	100½
Rayonier Inc.	40¾	37⅞
Rhinelander	39½	36
Scott Paper	67⅞	67⅜
Same $3.40 Pref.	95	96
Same $4.00 Pref.	*103½-104	—
St. Regis	42½	43½
Same Pref.	*102-103	103½
Sutherland	47	46½
Union Bag & Paper	97	102¼
United B & C	24	22¾
United Wallpaper	2⅜	1⅜
Same Pref.	21	19½
U. S. Gypsum	290½	320
Same Pref.	179	177¼
West V. P & P	46	45¼
Same Pref.	*106-107½	—

New York Stock Exchange — Bonds		
A. P. W. 5%	80½	81⅛
Celotex 3¾%	—	—
Champion P & F Co. 3¼%	—	97½
Mead Corp. 3½	—	—

American Stock Exchange — Stocks		
American Writing	—	20¾
Brown Co.	19¼	17
Puget Sound	68	60⅜

*Closing Bid and Asked Prices.



Paper Mill Crane designed for future wider span

This 59-foot span NORTHERN CRANE was recently installed in a newly built paper mill in North Carolina.

To provide for a possible future expansion and rebuilding of this mill, the crane has been designed and built so that it may be lengthened to approximately double this original span.

This installation reflects Northern's long, comprehensive experience in designing and building overhead electric cranes to deliver the particular services required by the paper mill industry; and to assure fast, safe, dependable operation in the wider bay buildings now preferred for industrial manufacturing.

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NORTHERN ENGINEERING WORKS
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KELCO COMPANY

The Paper Industry

FEBRUARY 1956

No room for complacency

The optimistic outlook widely expressed by paper industry leaders, and reflecting the growth of various segments of the American industry, requires continuous and intensive cultivation.

We know that much of this optimism represents a state of mind, brought about by mental reverberations of one success story after another. Economists have been telling us for years that industrial booms and economic depressions do not just happen but find their origin in men's minds.

Since no one would deliberately want to create conditions that introduce an unhealthy climate into a prosperous economy, and since it seems to be within our power to prevent the occurrence of depressions, a logical question that comes up periodically is, "why then does society keep on living in constant fear of depressions, and why are we inclined to accept their inevitability?"

We may be sure it is not altogether ignorance about matters pertaining to our national economy that makes people doubtful about man's ability to prevent economic upsets. Often it is some peculiar trait in our psychological makeup which seems to throw a monkey wrench into our beautiful visions of perpetual industrial booms.

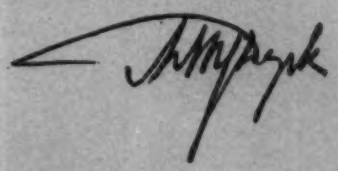
We all know there is nothing as successful as success. On the other hand, it is also true that prolonged success may bring complacency and thereby undermine our determination to succeed. This may lessen our vigilance, our creativeness and our competitive spirit—all of which are essential to a growing economy.

If a relaxation in our creative effort is not immediately checked, and if a feeling of lassitude is permitted to spread over a wide enough segment of our industrial structure, it is then that a minor economic setback may panic the nation into a depression of major magnitude.

It is well therefore to watch for any of these danger signals and to discover in advance whether there is a relaxation of productive effort or whether there is a lack of creative thinking.

Examining the pulp and paper industry from this point of view, we find that no weaknesses of this nature are anywhere apparent. The pulse of this industry is strong, the output at its highest, expansions are proceeding with renewed vigor, and the role of scientific and engineering research as a major factor in the industry's growth has flared up to a level of unprecedented acceptance.

While the outlook for the pulp and paper industry in 1956 is extremely promising, we must not give way to complacency. It is everyone's responsibility to keep the optimistic state of mind vibrantly alive by providing a constant stimulus for new and creative thinking. It is the degree of thinking that will determine the growth of our industry—and only growth in its broadest meaning is synonymous with continued progress.



World's largest Yankee tissue machine in operation at Crown Zellerbach's St. Helens mill

Beloit-built Yankee dryer roll — world's largest

THE WORLD'S LARGEST Yankee tissue machine went into operation at Crown Zellerbach Corp's St. Helens, Ore. mill in March 1955. No. 3 machine has a 258-in. wire, a speed of 3000 fpm and an output capacity of 100 to 120 tons per day.

Resident manager of the St. Helens mill is R. J. Schadt. Assistant resident manager and project engineer, who supervised the expansion project, is Raymond Dahl, and Arthur Newcomb, superintendent of paper machines, is in charge of production.

Stock preparation

Stock is refined in two Miami No. 5 jordans and a Clafflin refiner.

A metering system, consisting of seven rotary positive displacement meters, measures predetermined quantities of groundwood, short fiber,

R. J. Schadt, resident manager

Raymond Dahl, asst. resident manager

Arthur Newcomb, paper machine supt.

Another view of the Yankee dryer

View of 258-in. wire on No. 3 machine

View of head box and inlet from the fan pump

Bauer cleaners remove dirt before stock goes through the fan pumps

View of Roots-Connersville vacuum pump

View of the Worthington fan pump

One of the two Beloit winders with roll breaker in left foreground

The roll breakers in action on the Beloit winder

bleached kraft, broke, and the various colors into a type 304 stainless steel Slushmaker.

The meters, made of bronze, are mounted on a multiple-compartment stainless steel vat. All meters are geared together and are driven by a 3-hp motor through a H-2 PIV variable-speed drive, the speed of which is controlled by an air signal actuated by the level within the receiving chest. The master drive can be varied over a 6:1 speed range.

Four of the seven meters measure pulp and three meters measure colors. Each of the pulp meters has its individual H-1 PIV drive with speed ranges of either 4:1 or 6:1. One meter has a range of 30 - 100 per cent, the second 7 - 40 per cent, and the remaining two, which handle either the broke or short fiber, have a range of 5 - 30 per cent. Each meter is equipped with a recording counter to give the total revolutions for any given period and a recording indicator to show the proportions of these four pulps at all times. Two of the color meters are designed for use on light tints and permit the addition of from 0.4 to 1.4 gal. of color per ton of paper from one meter, and 3 to 14 gal. per ton on the second. The third color meter has a capacity up to 40 gal. per ton of paper to be used when making deep shades.

The unit is exceedingly compact as the floor space occupied is only 8 by 10-1/2 ft. The supply of pulp to each of the four pulp meter compartments and the supply of color to the color meter supply compartments are all controlled by float valves. The pulp meters themselves are substantially undershot water wheels having a four-bladed rotor. As the rotor revolves, it transfers definite quantities of pulp from the supply compartment to the discharge hopper. At each revolution the discharge from all four pulp meters and from the three color meters is brought together into an inclined hopper receiving spout, where it is thoroughly mixed by the interference of flow lines and passes as a uniform mixture into the receiving chest through a single 12-in. pipe.

The Slushmaker with a type 304 stainless steel tank (rated at 4000 lb. at 6 per cent consistency) and a 43-in. Model A pulping unit are powered by a 350-hp motor through a speed reducer. All parts of the pulping unit that come in contact with the stock are made of 13 per cent chrome steel.

The Slushmaker operates on a partially automatic system. When the batch in the pulper is ready to be dumped, the operator starts the pump, and the dump valve at the bottom of the tank opens automatically to drain the tank. When the pump is stopped, the dump valve closes and fill-water flows in automatically to a predetermined level.

The paper machine

The 3000-fpm tissue machine, with a 258-in. wide wire, features a patented air cushion control flow inlet. It has motor-driven rectifier rolls which control the approach flow to the slice. A motor-driven straight slice meters the flow of stock onto the wire. A 24 LA-2 fan pump of horizontally split case double suction type pumps the stock into the headbox.

A bronze breast roll, stainless steel forming board, dandy type table rolls, rubber-covered plain table rolls and stainless steel deflectors make up the forming area of the fourdrinier.

Three stainless steel suction boxes are fitted with end-of-grain maple covers. A stainless steel saveall, specially designed to minimize the splash from the fourdrinier, serves the entire wet end from the breast roll to a position beyond the suction boxes.

The suction couch roll is designed to control the dewatering of the sheet before it is transferred to the press section. The return wire run features a turning roll, patented air diaphragm wire guide, automatic felt stretcher, and oscillating wire roll doctors.

The press section features a 40-in. rubber-covered suction press, two 40-in. rubber-covered suction pressure rolls, and the suction wringer arrangement on the pickup felt. All press rolls are equipped with air diaphragm-loaded swing arms to maintain the desired nip pressures and to provide maximum ease in handling felts and removing rolls.

The vacuum required for the first and second pressure rolls, suction wire boxes, suction wringer roll, suction couch, suction pickup and Vickery felt conditioners is provided by seven vacuum pumps. These pumps supply a total of approximately 33,000 cfm of air at 10- to 20-in. Hg vacuum. The sizes of these pumps include two 16-by-40 single-stage pumps, one 14-by-35 single-stage pump, and two 20-by-40-by-20-by-16 two-stage pumps. The 14-by-35 single-stage unit was arranged for a direct connection to a special shaft extension from one of the 16-by-40 units to make a two-stage compound pump.

The 12-ft. Yankee dryer, of high-pressure design, is one of the largest in operation in the world and weighs approximately 150,000 lb. The dryer is equipped with high-speed condensate removers and specially designed

high-pressure balanced steam joints for efficient condensate removal. The sheet is creped on the dryer by an air cylinder-operated oscillating creping doctor. A second oscillating doctor cleans the surface of the dryer. During blade changes a skinning doctor strips the sheet from the Yankee ahead of the creping doctor. A paper-carrying roll directs the paper run between the dryer and the calender.

A Liebeck broke disintegrator is installed under the dry end of the machine. This unit consists of a double-ended Liebeck incorporating four heavy-duty propellers. It is arranged so that broke in any quantity may be fed directly into the disintegrator. The tank is of tile construction, and the stainless perforated extractor grates are arranged so that stock may be extracted on a continuous basis.

Paper machine drive

The paper machine is driven by a speed regulating drive system consisting of 14 dc motors, totaling 17,063 hp, which drive the fourdrinier, Yankee felt, first calender, second calender and reel. These motors receive dc power from five generators, each of which is controlled by an electronic, amplidyne speed regulator.

One of the special features at this mill is that the fourdrinier section has its own speed-regulated drive. This is in accordance with the latest thinking for tissue machines and is in contrast to the usual practice of having the fourdrinier section driven by a helper motor receiving power from the Yankee section generator.

Another unusual feature is that the Yankee dryer is chain-driven by an unusually low-speed motor (500 hp at 350 rpm) having three-bearing construction. Compensation for wear of the chain-drive is provided by a sliding base on which the motor is mounted.

The drive system permits (1) speed regulation of each section to a steady-state accuracy of 0.1 per cent or better; (2) coordination of all five section-drives by a master operator's station with one master speed control; (3) timed acceleration and deceleration; (4) draw control by rheostat setting for any desired speed ratio between sections; (5) a separate crepe adjusting rheostat for setting the speed ratio between the Yankee felt section and the entire dry end of the paper machine; (6) independent operation of any one or more sections as desired; (7) slack pickup by pushbutton control; (8) load indication of each sec-

Principal equipment and suppliers at St. Helens

Stock Preparation

Claflin refiner (1) — Emerson Mfg. Co.
Cleaners (8), 6 primary, 1 secondary, 1 tertiary — Bauer Bros. Co.
Jordans (2), Miami No. 5 — The Black-Clawson Co.
Motor (1), 400-hp induction for stock mix pump — Westinghouse Electric Corp.
Motor (1), 350-hp induction for Morden Stockmaker — Westinghouse Electric Corp.
Mix pump (1) — Goulds Pumps Inc.
Proportioning and metering system with 7 rotary positive displacement meters (4 for pulp and 3 for colors), each with M-I PIV drive — Trimbey Machines Inc.
Slushmaker, with type 304 stainless steel tank (rated at 4000 lb. at 6 per cent consistency) and a 43-in. Model A pulping unit — Morden Machines Co.
Stock chests (5) — Chemical Linings Inc.
Stock pumps, with Teflon seal caps — Worthington Corp.
Variable speed drive, M-2 PIV master drive, variable over a 6:1 speed range — Link-Belt Co.

The Paper Machine

Crane, 30-ton capacity — Ederer Engineering Co.
Fan pump (1), 24 LA-2, horizontally split case — Worthington Corp.
Hood, ventilation, etc. — Drew Engineering Co.
Liebeck broke disintegrator (1), double-ended, with four heavy-duty propellers — E. D. Jones & Sons Co.
Motors (3), two 350-hp and one 400-hp synchronous, for vacuum pumps — Westinghouse Electric Corp.
Motor (1), 600-hp induction, for fan pump — Westinghouse Electric Corp.
Motor (1), 400-hp induction, for Yankee hood air system — Westinghouse Electric Corp.
Motors, under 100 hp — Allis-Chalmers Mfg. Co.
Oil system — Bowser Inc.
Paper machine, 258-in. 3000-fpm, with air-cushioned control flow inlet and motor-driven rectifier rolls and straight slice — Beloit Iron Works
Press section, 40-in. rubber covered suction press, two 40-in. rubber covered suction pressure rolls, and a suction wringer arrangement on the pickup felt — Beloit Iron Works
Rotoclones (3), one for Yankee dryer and two for winders — American Air Filter Co.
Saveall, 8 by 14 ft., specially designed to minimize splash — Improved Machinery Inc.
Suction couch roll, specially designed to control dewatering of the sheet — Beloit Iron Works
Wire pit — Chemical Linings Inc.
Yankee dryer, 12-ft., high-pressure design, with high-speed condensate removers and high-pressure balanced steam joints — Beloit Iron Works
Vacuum pumps (7), 3 single-stage and 2 two-stage, providing vacuum (10-20 in. Hg) for suction boxes, pressure rolls, couch, wringer roll, pick-up, and felt conditioners — Roots-Connersville Blower Corp.

Paper Machine Drive

Speed regulating system consisting of 14 dc motors driving the five sections of the paper machine — General Electric Co.
Generators (5), dc, controlled by an electronic amplidyne speed regulator, supplying the 14 dc motors — General Electric Co.

Calendering and Finishing

Calenders (2), air diaphragm loaded rolls — Beloit Iron Works
Hood, dust removing for winders — Drew Engineering Co.
Reel, latest design transfer type — Beloit Iron Works
Roll handling equipment, air cylinder-operated swing gate, motor-operated shaft puller, shaft transfer arrangement — Beloit Iron Works
Roll header (1), capable of handling 50-in. diameter and 90-in. long rolls — Valley Iron Works Co.
Roll wrapper (1), with air-operated ejector bar — Lamb-Grays Harbor Co. Inc.
Unwind stand (1), tape-driven — Beloit Iron Works
Winders (2), Model "L", 4500 fpm, with motor-driven shear cut slotters and pneumatically-controlled counterweighted rider roll, and roll breakers — Beloit Iron Works

Electrical Control System

AC control system 2300-volt centralized control center (1) for large motors — Westinghouse Electric Corp.
480-volt centralized control units (4), for small motors — Westinghouse Electric Corp.

Air Compression System

Compressor (1), two-stage, belt-driven, 125-hp type XLE-2,683 cfm capacity — Ingersoll-Rand Co.
Compressor (1), YC type, 13½ by 8½ by 7 in.; 600 rpm, 100 hp, 690 cfm capacity — Worthington Corp.
Receiver (1) — McCulloch & Sons

Grinders

Head knife grinder (1), Model AK traveling wheel for precision grinding of 260-in. capacity doctor and paper blades — Hanchett Mfg. Co.
Slitter knife grinder (1), Model SK-24 for precision conditioning of circular knives of top and bottom type slitters — Hanchett Mfg. Co.
Roll grinder (1), 42- by 304-in. two-wheel, swing-rest type — Farrel-Birmingham Co. Inc.

tion by ammeter at each operator's station; (9) regenerative breaking of all sections.

Electric control system

The ac controlled equipment for No. 3 tissue machine consists of a 2300-volt centralized control center for large motors and four 480-volt centralized control units for small motors.

The 2300-volt control has an interrupting capacity of 150 mva and includes ground relaying and oil-immersed contactors. All motors above 150 hp are 2300-volt synchronous and induction motors. The 2300-volt control is applied to the following motors:

Jordan No. 1	400-hp synchronous motor
Jordan No. 2	400-hp synchronous motor
Vacuum Pump	350-hp synchronous motor
Vacuum Pump	350-hp synchronous motor
Vacuum Pump	400-hp synchronous motor
Slush Maker	350-hp induction motor
Dry End MG Set	200-hp induction motor
Yankee Hood Air System	400-hp induction motor
Main Stock Fan Pump	600-hp induction motor
Stock Mix Pump	400-hp induction motor

Control for synchronous motors utilizes the SIPSYN field frequency relay scheme for certain applications of the field at proper motor speed and at the proper angular position of stator and rotor poles.

The 480-volt control is made up of standardized unit control centers and molded case circuit breakers. The interrupting capacity of the system is held at 15,000 amperes by current-limiting reactors, which coincides with the interrupting capacity of the smallest breaker used in the motor control.

Air compression system

The air compression system includes two air compressors, of 690- and 683-cu. ft. per minute capacity, and a 42-in. by 10-ft. air receiver.

The 683-cu. ft. per minute air compressor is designed to operate at a discharge pressure of 100 psi. It is a two-stage, 125-hp, belt-driven air compressor with a horizontal low-pressure cylinder and a vertical high-pressure cylinder, equipped with inter-cooler for cooling air between stages of compression.

The 690-cu. ft. per min. air compressor is a 100-hp unit running at 600 rpm and featuring the feather valve. It is equipped with the after cooler, the receiver, and the suction filter. This unit also features the five-step controls.

Calendering and finishing

The calender section consists of two separate pairs of air diaphragm loaded rolls. These rolls are arranged for successive softening and smoothing of the creped sheet.

The machine is equipped with the latest design transfer type tissue reel. A bench board with complete controls is provided.

A tape-driven unwind stand serves the two heavy duty Model "L" 4500-fpm winders equipped with dust-removing hoods. These winders are designed to preserve the bulk crepe of the tissue. They feature motor-driven shear cut slitters and pneumatically controlled, counterweighted rider rolls. They are serviced by a Monorail with two hoists.

Modern roll handling equipment features an air cylinder-operated swing gate, motor-operated shaft puller, and shaft transfer arrangement. The rolls are broken and ejected one after the other for transportation to the converting area.

A 108-in. roll wrapper consists of finish machined type rolls mounted on antifriction bearings and driven by gear motor. An air-operated ejector bar is mounted between the pipe rolls. The ejection or removal of a roll from the wrapping rolls is remotely controlled by pushbutton operation.

A roll header handles rolls up to 50 in. in diameter and 90 in. in length. The roll header is floor-mounted and has an air cylinder mounted on both ends of the machine, which allows both platens to move. The cycle in the semi-automatic operation is so arranged that after the roll and pasted heads are positioned, a pushbutton energizes the air valve; and the platens will contact the roll, holding it under pressure until the end of the time cycle. The heads then retract, and an ejector arm ejects the headed roll from the far side of the machine. The platens are electrically heated. Eight sets of vacuum nozzles and a vacuum pump hold the pasted heads to the platens.

An accurate physical inventory in the shortest possible time

GEORGE J. BEVANS*

HOWEVER EFFICIENT a mill's accounting system, everyone agrees on the necessity of reconciling its book inventory records with an annual physical check of materials actually on hand. Two methods for taking this physical inventory are widely used. One is to cover all storage areas in the course of a year by checking the stock on a different section of floor each successive week. The other is to perform the entire job at one time.

The advantage of this latter method is that it gives an accurate picture of the over-all situation, so that all records can be reconciled simultaneously. The traditional objection to taking physical inventory of the whole plant at one time is that it interferes with, often totally stops, production for several days while the job is being done.

But now a method for taking inventory in a large plant in a single day has been perfected by Gene H. Kline, a top accounting executive with the General Foods Corp., in whose plants this method is being successfully used.

The method in twelve steps

The complete procedure embraces only 12 simple steps.

1. Draw an easily understood diagram of each floor area in the plant to be inventoried. Have sufficient

*Management engineer, Systems Council

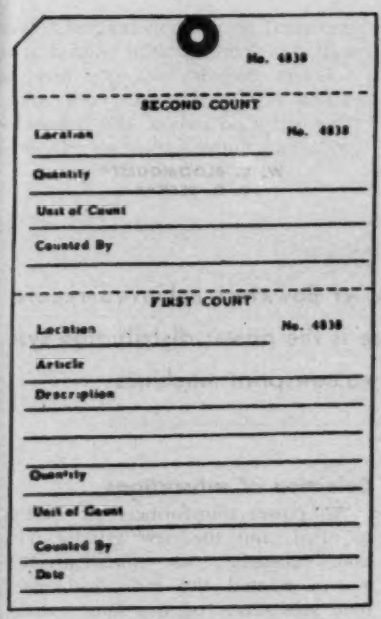


Fig. 1—Inventory control tag

copies made so that each of the two counting teams may have a copy, at least for that section of floor for which they are responsible; each supervisory team will have a copy, and there will be a surplus in case some copies become mislaid.

2. Divide the manpower available for the actual counting into two-man teams and draw up an assignment sheet showing the areas each team is to count. (Provide for having each area counted twice by different teams. This makes for accuracy.)

3. List all classes of items to be counted in each area, indicating how each class is to be recorded; i.e., whether in pounds, barrels, dozens, gallons, etc.

4. Select a two-man team to supervise the counting in each area or group of areas. Usually each supervisory team should consist of the foreman who supervises that section of the plant and an accountant to work with him.

5. Have an established manufacturer of patched system tags supply you with a quantity sufficient for recording on a separate tag the quantity of each different class of material found stored in each separate area to be inventoried. (A model for this tag is reproduced in Fig. 1. These tags should be prenumbered in sequence. Only an established tag manufacturer has the facilities for producing such tags at the most economical price.)

6. Give to each supervisory team a quantity of tags sufficient for the counting teams assigned to the areas under the supervisory team's direction. Record those tag assignments by numbers on an inventory tag control schedule, such as is reproduced here in Fig. 2. Explain to all concerned that every tag issued must be strictly accounted for.

7. Prepare and issue lists of counting instructions for the guidance of each supervisory team and for all counting teams.

8. Hold a meeting with all supervisory teams, going over with them your typed or mimeographed counting instructions word-for-word and clearing up any questions the men may raise.

9. See that the supervisory teams hold a similar meeting with the accounting teams under their respective direction.

10. As early as possible on the day selected, start the actual count. (If tags assigned to a supervisory team for distribution to its counting teams prove insufficient, do not allow the team to borrow any tags from other teams. Insist that they obtain any additional tags needed from a central control so that the tag numbers may be properly recorded on the inventory tag control schedule.)

11. The first counting team counts an area and should attach a tag to each pile or bin counted, fill out the lower section of this tag, tear off this stub and hand it in to the supervisory team for the area. The second counting team records its inventory figure on the second section of the tag, tears this stub off and turns it in to the supervisory team. The supervisory team should require that the numbers on the tag stubs turned in by the second team match exactly the numbers on the tag stubs turned in by the first team.

12. The accountant on the supervisory team should check the inventory figure on each tag stub turned in by the second team against the figure on the corresponding stub turned in by the first team and reconcile any variations. No erasures should be made. Any figures the accountant decides should not be used, should merely have a line drawn through them. The accountant may also classify by a symbol on the tag recording the first count the nature of the material counted; that is, whether it is raw material, material in process, or finished goods. All adjustments in figures should be made on the tag stubs used for the first count. Thus, only these stubs need be considered in the final tabulation made by the counting department, to which these stubs should finally be routed from the control center.

The advantages of this simple system for taking physical inventory are that it yields records which are highly accurate, fixes responsibility for any errors, and makes the actual counting work relatively easy for the participants. Thus employment of this simple system eliminates most of the headaches usually incident to this laborious and unloved task of taking physical inventory in a manufacturing plant.

INVENTORY TAG CONTROL SCHEDULE

Prepared By _____ Date: _____

BUILDING	INVENTORY LOCATION NUMBER	ASSIGNED FOREMAN	ASSIGNED ACCOUNTANT	PRE-NUMBERED INVENTORY TAGS CHARGED OUT	NUMBER OF TAGS CHARGES OUT	TAGS RET'D SPOILED OR VOIDED	SIGNATURE OF ACCOUNTANT RECEIVING TAGS
C&C Basement	B-1	Smith	Fletcher	001-075	75		
	B-2	Black	Fletcher	076-150	75		
C&C 1st Floor	PR	Parker	Martin	151-300	150		
C&C Warehouse	W-1	Burns	Hagen	301-900	100		
No. 2 Warehouse	A-1	Mapes	Long	901-1050	150		
York (Skids & Drums)		White	Long	1051-1100	50		

Fig. 2—Inventory tag control schedule

Power distribution system at Bowaters Southern Paper Corp. mill

W. C. BLOOMQUIST*
C. D. BECK**

▶ No. 1 Beloit newsprint machine at Bowaters achieved record speeds in excess of 2100 fpm. Here is the power distribution system that operates the company's two newsprint machines

THE POWER DISTRIBUTION system at the Bowaters Southern Paper Corp. mill is shown as a simplified one-line diagram in Fig. 1. This arrangement was greatly influenced by the contract with TVA, electrically by its transformer bank rating, and physically by the location available for equipment and the outdoor 154-kv substation, approximately 1400 ft. from the grinder area and 2100 ft. from the power house.

The system is basically a simple radial arrangement, except that some loads are served by a secondary-selective radial system.

Normal operation is to parallel with TVA, although the loads are such that the mill load can operate separately from the grinder load.

Future expansion

This power system was purposely arranged for considerable expansion of the electrical load. The circuit arrangements, breaker ratings, and characteristics were planned and selected with that in mind. For example, several additional generator sections can be added, the TVA capacity can be increased, or the capacity of the TVA-mill tie circuit increased without exceeding the present breaker ratings. This is practical because of the synchronizing bus arrangement. Already, an expansion program is under way, more than doubling the generation capacity. This is being cared for simply and conveniently, as shown in Fig. 1, because expansion possibility was one of the factors in the selection and layout of the original power distribution system.

Allowance was made, whenever practical, for the physical expansion of the electric system to go along with that provided electrically. For example, the TVA 154-kv line towers have space for a second line, and the substation has space for additional transformers and circuit breakers. Bowaters' cable system from the TVA substation to the mill can easily accommodate several more cables. The 13.8-kv grinder substation can be expanded. There is space for a step regulator should that become necessary to control kilowatts to the TVA system.

New 750-mva switch gear used for power system expansion

Bowaters is the first industrial user of the new 750-mva vertical lift metal-clad switch gear. This new 750-mva metal-clad switch gear is a "natural" for use with a generator of this rating, 32,000 kva. Here, the reactance of the synchronizing bus-tie reactor for this new generation bus need be only a modest 4 to 5 per cent instead of 12 to 15 per cent if 500-mva vertical lift switch gear were used.

Selection of voltage levels

It will be noted from Fig. 1 that 13.8 kv is used for the backbone of the system—both for the mill generation and the TVA tie. The 13.8-kv level is the logical one for distributing the blocks of power in the mill and allows for future electrical growth.

The other major mill voltages are 2400 and 480 volts, plus 120 volts for lighting, receptacles, etc.

Note that 4160 volts is used for the grinder area. This raises some natural questions such as, (1) why not make these large grinder motors for operation at 13,800 volts; or (2) why not make the grinders for a 2400-v operation, or (3) why not change the mill voltage level from 2400 to 4160 to match the grinders? Why was this extra voltage level introduced?

The 4160-v level was selected principally for the grinder area's eight 4500-hp grinder motors after an exhaustive study which showed a saving of about $150,000. For the mill area, a 2400-v distribution system proved to be the most practical and also the most economical, since there is no operational advantage or duplication of switching equipment realized. For all practical purposes, the grinder load is separate.

Selection of substations

All power transformers are Pyranol†-filled, and the new grinder outdoor substations are oil-filled. Bowaters wanted the mill load-center unit substations of the same rating, and it has one transformer as a spare for these 22 units.

The master unit substations, being few in number, were selected to match the load but with some allowance for load growth. The rating of the transformers in the boiler house was determined by voltage drop on motor starting other than load.

The impedence of the grinder substation transformers is 7.5 per cent, a little higher than standard, and this was specified to take advantage of the economical drawout-type switch gear of the 250-mva level.

Table I shows the ratings of the substations:

TABLE I

Location	Sec. Volt.	Trans. KVA Rating	No.
Mill	480	750	22
Paper Machine	2400	3000	2
Stock Preparation	2400	2000	2
Raw Water Station	2400	2000	1
Boiler House	2400	2000	2
Grinder	4160	15000	2

Seventy motor-control centers with fused starters are supplied from the 22 load-center unit substations.

Figs. 2 and 3 show typical installations of substations throughout the mill.

Location of transformers and switch gear

Because of the atmospheric conditions associated with the paper mill, e.g. chemicals and moisture, every effort was made to locate the electric apparatus indoors or away from the

*Manager Application Engineering, General Electric Co.

**General Mill Engineering, System Application Eng. Section, General Electric Co.

†Registered trademark of General Electric Co.

mill. Chemical deposits on transformer or breaker bushings may cause them to flash over and interrupt power.

For this reason, the TVA 154-kv substation was located on a site away from the prevailing winds and about one-third of a mile from the mill.

The 15.8-kv grinder substation was located in an alcove under the grinder room to minimize exposure, Fig. 4.

In general, the boiler house, paper machine, woodyard substations, and switchgear are located in rooms that are clean and reasonably dry.

All breakers are of adequate interrupting capacities

All breakers were selected with adequate interrupting capacity and, in several cases, with some margin for future growth. Wherever possible, the drawout breaker was selected for maintenance purposes. The 480-, 2400-, 4160- and 13,800-v mill breakers are drawout type. The 13.8-kv breakers on the grinder bus are of the stationary type because the short circuit duty on this bus is above the 500-mva level.

System neutral grounding selected for all voltage levels

The decision to design and operate this mill with the system neutral grounded at all voltage levels was influenced considerably by Bowaters' experience at its ungrounded Corner Brook, Nflnd. mill. The trend in paper mills, as well as all industry, is for grounded neutral system operation.

The 2400-, 4160- and 13,800-v systems are grounded by resistors to limit the ground fault current, while the 480 and lower voltage systems are solidly grounded, as indicated in Fig. 1.

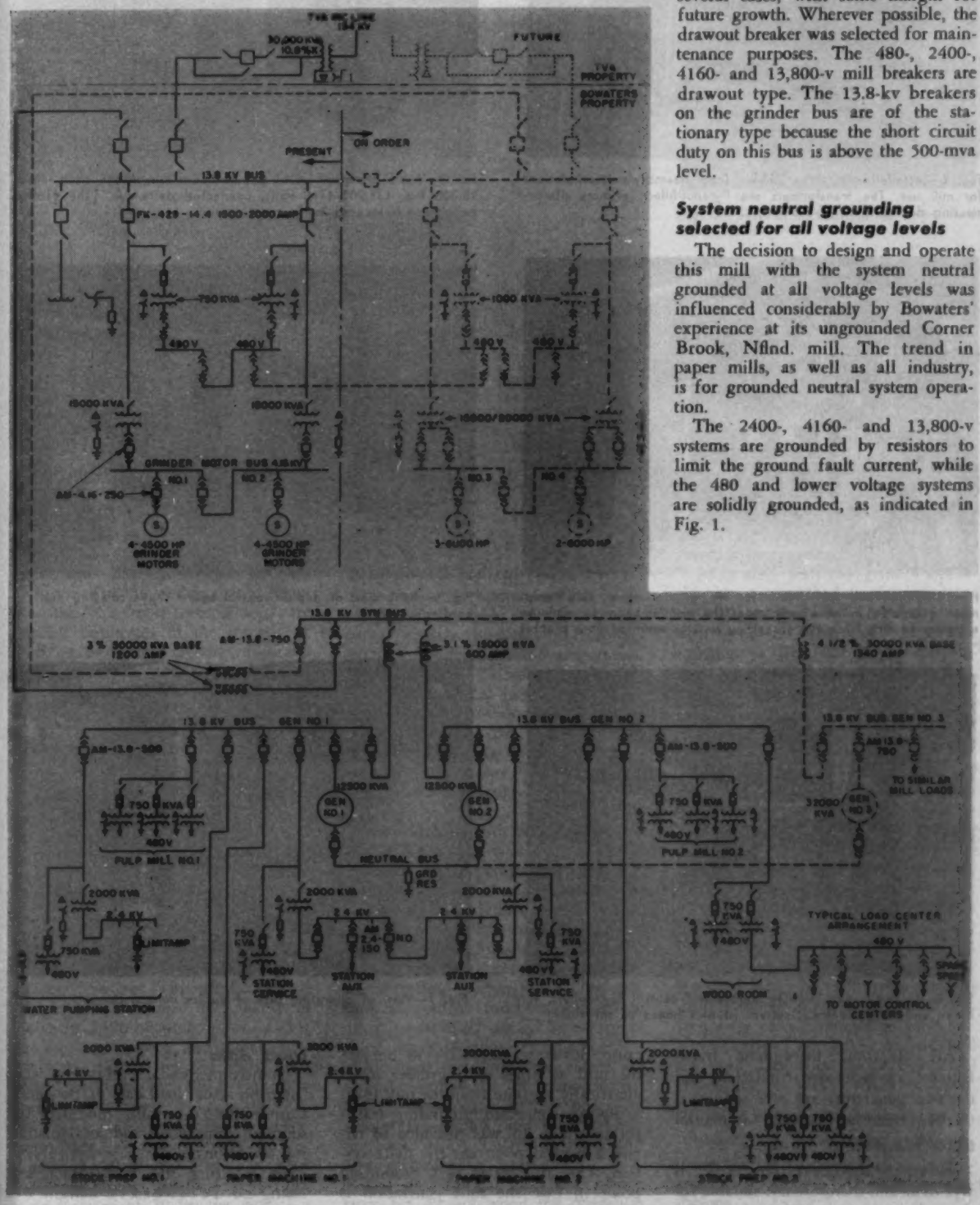


Fig. 1—Simplified one-line diagram of the power system (current expansions shown dotted)

Fig. 2—Installation of three 750-kva load assembly unit substations for mill use. The transformers are Pyranol-filled; primary disconnecting device is an SE-5 switch

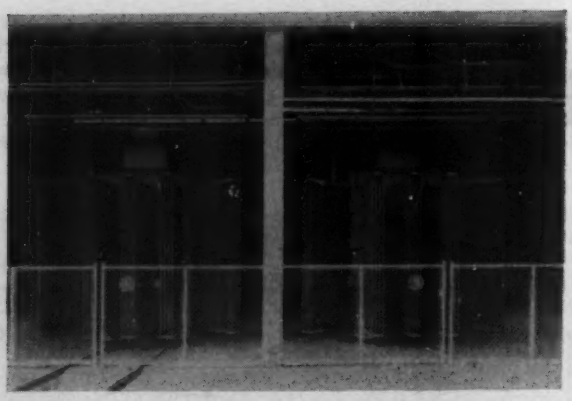


Fig. 3—Power transformers of grinder room substations, each rated 15,000 kva, 138,000/4160 volts, connected delta-wye. (The 4160-v switchgear is located in the room above)

Fig. 4—The 13.8-kv switchgear for the grinder room. This equipment is located in an alcove under the grinder room to minimize exposure to dirt. Note the grounding resistor mounted on a bracket

Fig. 5—Back view of duplex control board shows relaying and recording charts

Fig. 6—Over-all view showing centralized control for boilers, turbines, and main electrical system (duplex board on the right)

Fig. 7—View of operating side of duplex control board

All of these three-phase transformers are delta-wye connected, and the two generators are wye connected to conveniently establish a neutral grounding point.

However, the TVA transformer is wye-delta and therefore not suitable for grounding at the 13,800-v level. Because Bowaters may wish to operate the mill at times with grinder loads electrically separate from the mill load, a zig-zag connected grounding transformer (Fig. 1) was provided to derive a neutral point for the delta system. This also serves as a grounding point in case the mill generation is down.

Load data

Transformer and circuit ratings were based on actual load data of Bowaters' Corner Brook mill, modified for southern pine wood and local operating conditions.

In selecting the transformer kva rating no deliberate margin was allowed for future mill expansion.

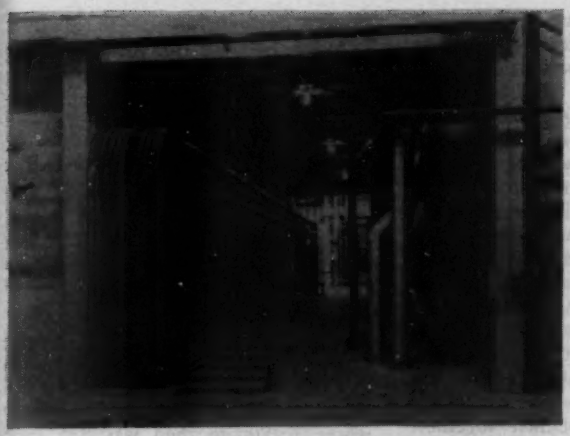


Fig. 8—Installation of 13.8-kv interlocked armor cable from power house to various unit loads.

Fig. 9—Several installations of interlocked armor cable

Fig. 10—General view of turbine room showing two 10,000-kw units, the condensing unit in the foreground and non-condensing unit in the back. The 13.8-kv switchgear is on the left

Additional transformer capacity will be supplied as the load increases. However, the load center transformers were selected duplicates in the interest of spare parts. Ratings of the additional transformers for the mill expansion will be higher than the initial ones; e.g. 1000 kva for the load-center units to allow for some load growth, and 15,000 to 20,000 kva for the new grinder substations because the grinder motor horsepower ratings were increased appreciably.

The present total mill load is approximately 43,000 kv and is just about evenly divided between papermaking and grinder loads. In general, the grinder load portion is supplied by TVA, although normally the mill and grinders operate tied together.

The over-all mill power factor is about 97 per cent. This excellent operating power factor is due mainly to the eight 4500-hp unity power factor synchronous motors and other synchronous motors in the mill. The power factor of the 480-v load is a round 80 per cent.

There are approximately 1300 motors, totaling around 74,000 hp, including the dc drives. There are about 1440 volt motors, totaling 20,000 hp, or an average of 20 hp per motor.

Centralized control features

Control and instrumentation is receiving considerable attention in the paper industry. Bowaters carefully selected the instrumentation and control on the basis of (1) operating simplicity and (2) actual benefits to be obtained from provision of recorded information. The control, instrumentation, and relaying of the major circuits and loads are provided on a duplex control board as shown in Fig. 5.

The control and relaying of the 13.8-kv system, as well as other major circuits, are centered on a duplex control board. The location of the duplex is interesting and different from that of most mills. Note from Fig. 6 that the boiler house, steam, and electrical intelligence are centralized—certainly an operating convenience. This centralized control function applies to other parts also; e.g. chemical processes, paper machine operation, etc.

Electrical metering and control are rather complete for the main circuits. Fig. 7 shows the front or operating side of the duplex, and Fig. 5 shows the back, which contains relaying and some metering.

The operator can tell at a glance from his duplex board the operation of the mill, which is useful not only for normal operation but also for emergencies.

Every substation has a minimum instrumentation of a watthour meter, ammeter, and volt meter. The watthour information is used for quality control and accounting purposes. With this basic instrumentation an electrician can also get spot checks on power factor, often useful in analyzing the 480-v loads.

Control of the pumps in the Bowaters substation, about three miles away, is by supervisory equipment.

Associated with the grinder operation is a master load (watt) regulator as well as individual regulators for each grinder. These load regulators function to even out the load variations associated with grinding of lots.

Relaying

The following relaying has been included in addition to standard basic relaying:

Differential for: generators, grinder motors, the four major buses (PVD relays) grinder substation transformers, TVA tie, 13.8-kv tie from grinder bus to the mill.

IJCV for generators

Current balance for grinder motors

TVA tie

Since the mill generation can normally supply only about half the present total load, the mill frequency will drop if the TVA tie is lost. An underfrequency relay "watchdogs" the system. If the TVA tie is opened and the load frequency drops below 59 cycles, the grinder load is dropped.

Parts of cable system unusual

The selection of cable, although made several years ago, is in accordance with present TAPPI recommendations.

There is nothing unusual in this cable selection except that this was Bowaters' first experience with interlocked armor cable. The savings with interlocked armor cable turned out to be substantial, and according to Bowaters more of this type of cable will be selected in the future.

Fig. 8 shows a run of 13.8-kv cable from the power house. Fig. 9 shows a view looking up to the ceiling from the basement of the power house. This clearly shows how simply an unusual cable configuration can be handled with interlocked armor cable. This photo also shows a tray for the control cables. The control and power cables are kept physically separate.

Most of the interlocked armor cable installation is conventional; i.e., on Stacey aluminum racks and terminations with PLM fittings. However, there is a new and unusual underground system in the 14,000-ft. run between the TVA and the grinder room substations. For part of the distance from the TVA substation the cables are on a rack a little above ground. They then enter a cable trough arrangement. This trough is of concrete with a removable metal cover. Cables are easily installed; obviously, no manholes are needed. Most important, however, is that if a cable must be replaced in an emergency, it can be done in a fraction of the time required by a duct and manhole system.

Because of building expansion, the present cable system will have to be relocated. All that will be required is construction of a new trough, and then the present cables can simply be lifted into the new troughs.

Another unusual feature is the installation of interlocked armor cable supported on cable rings on a messenger. It was thought that difficulty would be experienced in pulling the armor through the rings because the rings might catch in the convolutes of the armor and bunch together. However, the cable pulled through the rings without trouble.

Lighting

The illumination level throughout the mill is high. The power supply is from the 480-v substation and is distributed to small dry-type, step-down transformers (480-120/240 volts) located throughout the mill.

High-bay lighting, e.g., the paper machine room, power house, and machine shop, are combination mercury and incandescent. Storage and similar areas have incandescent lighting and offices have fluorescent lights. Certain outdoor areas are lighted.

Power generation

About half of the present power requirement is generated from process steam by two G-E turbine-generator sets shown in Fig. 10, rated as follows:

No. 1—850 psig, 825 FTT to 2½-in. Hg. absolute with automatic extraction at 50 psig.

No. 2—850 psig, 825 FTT to 50 psig with automatic extraction at 150 psig.

Turbine No. 3 will be rated 32,000 kva.

The selection of the boiler pressure and temperature was influenced by design conditions of recovery boilers whose maximum then was 875 psig and 825 FTT. Table II shows the boiler ratings:

TABLE II

Type	No.	Capacity Lb/Hr
Power	2	150,000
Recovery	1	125,000
Bark Burning* (or natural gas)	1	125,000

*Normal output from bark supply about 70,000 lb/hr.

A description of the sectional drives, selection of motors, and specific utilization equipment will be published in a subsequent issue.

New results and ideas — in plastic coatings*

Glassine and Greaseproof

(Ralph T. Nazzaro, Westfield River Paper Co.)

▶ While the glassine sheet competes directly with plastic films for the same end use, glassine and plastic films can be united in many ways in film-glassine combinations. The inherent characteristics of glassine paper can be enhanced by a variety of converting operations, such as coating, waxing, and lamination. Thus, added properties of water vapor resistance, heat seal, gloss, scuff resistance, chemical inertness, mold retardance, wet strength, release properties, etc. can be incorporated in the glassine by the use of resins and films.

▶ Of all the coatings for glassine, cellulose nitrate is still the one most widely used, and improved moisture protection is afforded by incorporating small quantities of paraffin wax. Heat seal properties are incorporated by adding plasticizers and compatible resins which have a melting range of 150-300° F.

Butadiene-styrene copolymer formulations have been used with paraffin wax to achieve excellent water vapor transfer resistance and heat sealing properties, while vinylidine chloride copolymers give excellent water vapor transfer resistance and good grease resistance.

▶ The oldest and simplest of hot melt applications to glassine involve the use of paraffin wax. Waxed glassine is one of the most economical and highly water vapor proof packaging papers. By modifying the paraffin wax with such film formers as polyisobutylene, butyl rubber. hydrogenated rosin esters and polyethylene, coatings can be applied to glassine paper with excellent water vapor resistance, excellent water repellency, gloss and a small degree of heat seal property.

*Reported at the Tenth Plastic-Paper Conference of the Technical Association of the Pulp and Paper Industry.

▶ Of all the types of packaging materials compared, the laminated glassines show some of the better water vapor transfer resistance values in both flat and creased conditions. The laminated glassines are produced by bringing together two or more sheets of glassine in combination with modified microcrystalline waxes. The two most important functional properties of laminated glassine comprise the excellent resistance to the permeation of water vapor and the grease resistance.

▶ Since glassine lacks the elongation property or stretchability of the flexible films, it would be extremely desirable to incorporate synthetic polymers of a high degree of elongation without loss of tensile or mullen to improve the mechanical and dynamic properties of the glassine film. Glassine provides an ideal base that is smooth, dense, non-porous, air tight, odorless and hence is ideally suited for the incorporation of various film barriers.

Polyester Laminates Reinforced with Cellulosic and Glass Fibers

(L. P. Wenzell, Celanese Corp. of America)

▶ Combinations of bleached kraft and glass fiber mats, as well as combinations of bleached kraft, cellulose acetate staple and glass fibers as reinforcing mats give flexual and tensile strengths in the same range as those of all glass fiber mats, although the impact results are lower and the water absorbtion tests higher. This should make it possible to manufacture a cheaper mat due to the lower price of the cellulosics. The mats are actually made by a papermaking process and thus require no bonding agent.

▶ The results showed that mats made with the acetate (10 to 20 per cent acetate) developed very good surface characteristics without the use of a surfacing mat. These mats drape and work better than the old glass or glass-kraft mats. They also appear to wet-out with the resin better than the other mats. In all cases it is necessary to maintain a glass content of 50 per cent, or higher, in order to achieve the comparable physical properties of all glass mats.

Electrical Properties and Fire Resistance of Phenolic Paper Laminates

(M. Ezrin and S. H. Rider, Monsanto Chemical Co.)

▶ Free water absorbed from the atmosphere prior to laminating has a profoundly greater effect on electrical properties than does an approximately comparable amount of water liberated in the laminate due to the thermosetting reaction. While the presence of the resin retards the moisture pickup, the impregnation of the paper by the resin is never sufficient to eliminate the effect completely. Because of the much more hydrophilic nature of the cellulose, the water molecules become associated with it by means of weak physical forces. It is believed that the bonding of these water molecules to the cellulose molecules is strong enough so that they are not disrupted by the pressing operation and are left in the laminate as essentially free water associated with cellulose and without being intimately surrounded by the phenolic resin molecules. On the other hand, the water of condensation which is released during the pressing operation is completely surrounded by the network structure of the resin molecules. Consequently, the mobility of the water molecules is restricted and the effect on electrical properties moderated. This restriction of molecular motion does not exist in the case of the water absorbed from the atmosphere.

▶ The adverse effects of moisture absorbed are minimized considerably by impregnating the paper with a small percentage of a low-molecular weight water-soluble melamine resin or phenolic resin before treating with the phenolic varnish.

▶ The pretreatment with the melamine or phenolic resin also improves the fire resistance of the resin laminates in addition to a general improvement of electric properties. The improvement in fire resistance is much greater than would result from incorporation of the same amount of melamine resin into the cresol resin. The importance of fiber penetration by the resin as opposed to simply increasing the amounts of resin lying on top of the fibers was shown by the fact that doubling the melamine resin content of the paper from 8 per cent to 16 per cent before impregnation with aniline-modified cresol resin caused no further improvement in fire resistance.

Polyethylene and Polyethylene-wax Paper Coatings

(John C. Rice, Lowe Paper Co.)

▶ Theoretically, wax and polyethylene can be blended in all proportions. The polyethylene-wax consumption in 1955 was about six times that consumed in 1954, and leading consumers now specify polywax instead of polyethylene for multiwall bag liners.

▶ Recent methods of blending polyethylene with wax during the extrusion process include: (1) the use of mixing head which is attached to the extruder barrel into which molten wax is forced at a predetermined rate; (2) the use of two barrels which feed into a common manifold where the two streams of molten material are mixed. Both these methods, however, limit the type and number of ingredients which can be added to the polyethylene.

▶ Comparing the properties of a typical polyethylene-wax and polyethylene coatings in grease and solvent resistance tests, it was found that all the materials tested penetrated the polywax coating in two weeks at room temperature. Polyethylene coatings, on the other hand, showed fair to good resistance to all of the materials used.

▶ An acid and alkali resistance test showed that the addition of wax did not alter the acid and alkali resistance of polyethylene.

▶ Polywax coatings have a better moisture vapor resistance than polyethylene coatings. Polywax coatings can be readily heat sealed at somewhat lower temperatures than polyethylene, but the strength of the heat seal is lower than that of polyethylene. Polywax showed a heat seal strength of 0.6 lb. per inch, while polyethylene coatings showed a strength of 3.5 lb. per inch.

▶ Since polywax coatings have a lower coefficient of friction than polyethylene coatings, they may be expected to work more smoothly in converting operations when the coating comes in contact with metal machine parts. If it is desired to increase the coefficient of friction, it is possible to do so by introducing a tacky resinous or rubbery material.

▶ Polywax coatings are better release agents for pressure-sensitive adhesives than polyethylene.

Polywax blends present some problems in extrusion which are nonexistent with polyethylene. Thus, the temperature control during the extrusion of polywax coatings is more critical than with polyethylene. This condition is aggravated by the fact that there is considerable batch-to-batch variation with polywax, requiring different operating conditions for each new run and sometimes even within a run.

Miniature pulpwood plantation — after fifteen years

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DATA ON THE SURVIVAL and growth of a small pulpwood plantation during its first 10 years were presented in two previous articles in this journal [*The Paper Industry and Paper World*, May, 1945 (p. 220) and THE PAPER INDUSTRY, November, 1950 (p. 866)]. In April, 1940, a total of 400 transplants (50 trees each of eight species) were set out in 4- by 5-ft. spacing in the ravine to the rear of the research building of The Institute of Paper Chemistry at Appleton, Wis. Measurements on height growth and survival counts were continued annually until 1950 and biennially since.

In Table I is tabulated the percentage survival of the original 50 trees, the average height in feet and the tallest tree, the number of trees more than 4.5 ft. high, their average diameter at that height in inches, and the maximum diameter for all eight species at the completion of 15 years in plantation (total age, 18 years). In addition, the average height in feet and the average diameter breast high in inches is listed for the 10 tallest trees of each species. The total basal area is 26.7 sq. ft./A.

The height data at the end of the 1954 season are analyzed more thoroughly in Table II, which shows the distribution of trees in various arbitrary height classes.

It is also of interest to compare the height growth and survival of the original trees at five-year intervals. These data are presented in Table III.

After five years in plantation (total age, eight years), the survival was 76 per cent, the average height was 2.7 ft., and the tallest tree was 9.0 ft.

After 10 years in plantation (total age, 13 years), the survival was 70 per cent, the average height was 8.0 ft., and the tallest tree was 25 ft.

After 15 years in plantation (total age, 18 years), the survival is 57 per cent, the average height is 14.4 ft., and the tallest tree is slightly less than 40 ft.

Also given in Table III are the average heights of the 10 tallest trees of each species at 5, 10, and 15 years. These values are 3.8, 10.5, and 17.9 ft., respectively.

As evident in the tables, some species have done much better than others. For example, the survival of the Norway spruce and the white spruce is very good. Principal causes of death and injury appear to have been excessive soil moisture for red and white pines, sun scald for balsam fir, and suffocation by carelessly spilled fuel oil for jack and Scotch pines. Other contributing factors have been weed competition, volunteer tree competition, crowding, winter drouth, rabbits, mice, larch sawfly, pine needle rust, resin gnat, white grubs, snow and theft.

Growthwise, the European larch trees have done the best by far. Scotch pine is next best in both height and diameter. Of the native species, jack pine is the leader.

It is planned to continue these measurements at five-year intervals.

TABLE I—Fifteen-year Growth Data on Plantation Trees

(Fifty Trees of Each Species Were Used in the Initial Planting).

Jack pine	46	17.9	32.1	23	2.23	3.9	0.707	23.3	2.86
Scotch pine	58	22.4	31.1	29	2.96	5.4	1.513	26.8	3.53
White pine	38	9.8	15.7	19	1.07	2.3	0.173	12.9	1.64
Red pine	34	6.8	12.4	12	0.86	1.5	0.057	8.8	0.95
White spruce	86	7.9	15.0	35	1.10	2.3	0.300	12.9	1.90
Norway spruce	88	11.2	21.5	43	1.37	2.6	0.523	16.2	2.15
Balsam fir	38	4.6	9.7	9	0.56	1.2	0.021	6.3	0.56*
European larch	66	29.6	39.4	33	3.19	6.1	2.043	36.0	4.31
Total	57	14.4	39.4	203	1.85	6.1	5.337	17.9	2.24

*9 trees only

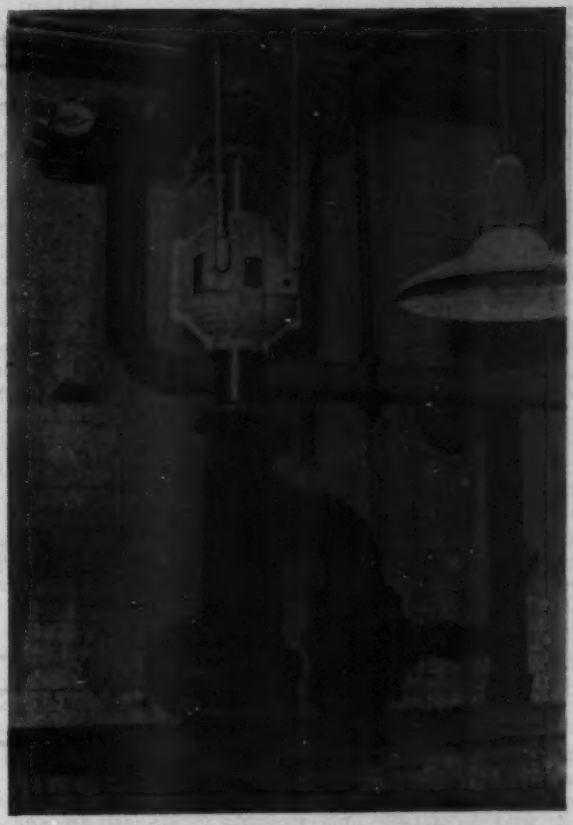
TABLE II—Distribution by Height Classes

	Height Class in Feet						
Species	Below 3.0	3.0-4.5	4.6-9.9	10.0-19.9	20.0-29.9	Above 30.0	Total
Jack pine			3	12	7	1	23
Scotch pine			1	8	19	1	29
White pine			11	8			19
Red pine	2	2	10	3			17
White spruce	4	3	25	11			43
Norway spruce		1	15	27	1		44
Balsam fir	5	5	9				19
European larch			1	2	9	21	33
Total	11	11	75	71	36	23	227

TABLE III—Survival and Height Growth at Five-year Intervals

	Height in Feet											
Species	Survival, %			Average Height			Av. Hght., 10 Tallest Trees			Maximum Hght.		
	5	10	15	5	10	15	5	10	15	5	10	15
Jack pine	82	78	46	5.3	12.4	17.9	7.3	17.0	23.3	9.0	20.5	32.1
Scotch pine	80	74	58	3.3	12.0	22.4	4.9	16.2	26.8	5.3	17.7	31.1
White pine	68	56	38	1.5	4.2	9.8	2.1	6.6	12.9	2.5	7.7	15.7
Red pine	50	40	34	1.5	3.9	6.8	1.9	4.8	8.8	2.8	6.1	12.4
White spruce	94	92	86	1.6	4.0	7.9	2.6	6.6	12.9	3.1	7.9	15.0
Norway spruce	94	92	88	1.9	5.1	11.2	2.8	7.4	16.2	3.6	9.3	21.5
Balsam fir	60	54	38	1.1	2.4	4.6	1.6	3.6	6.3	2.8	6.1	9.7
European larch	76	74	66	5.0	17.5	29.6	6.9	21.7	36.0	8.2	25.1	39.4
Total	76	70	57	2.7	8.0	14.4	3.8	10.5	17.9	9.0	25.1	39.4

Magnetic flow meter measures pulp stock flow without restriction or purge



A 4-in. Foxboro magnetic flow meter measures flow of 4 per cent pulp stock at the Gaylord Container Corp. Div. of Crown Zellerbach Corp. in Bogalusa, La. The instrument has been in operation since August 1955

DIFFICULT FLOWS, such as pulp stock and thick black liquor, have long plagued the paper mill instrument engineer. So important is it to measure the flow of these fluids that mills have resorted to purges and other accessory equipment, so that an orifice type or area type meter could be employed. While a purged meter was the best answer to the problem, a more efficient method has long been sought because purge equipment and related devices required considerable attention and maintenance.

With the advent of Foxboro Co.'s new magnetic flow meter it was obvious that a practical instrument was at last available to supplant conventional meters on this difficult service. More than 50 magnetic flow meters have already been specified, and reports from mills where installations have been made prove beyond doubt that the meter is ideal for such fluids.

Its main advantage is that it requires no artificial restriction in the flow line. With no flow nozzle, Venturi tube, or other constriction, the meter presents no more restriction to flow or opportunity for plugging than a corresponding length of standard pipe. Nor are there connecting lines in which the metered fluid can plug or freeze; hence, no need for purges or seal chambers.

Basic unit of the meter is a transmitter which directs a magnetic field across an unrestricted section of plastic-lined stainless steel pipe flanged into the flow line. Measurement is based on Faraday's law of electromagnetic induction. The flowing liquid acts as the conductor, generating a voltage directly proportional to its rate of flow through the pipe. Electrically connected to the transmitter is a Foxboro Dynalog instrument, recording in units of flow on a linear chart. The system maintains volumetric accuracy within 1 per cent of full scale over the entire range.

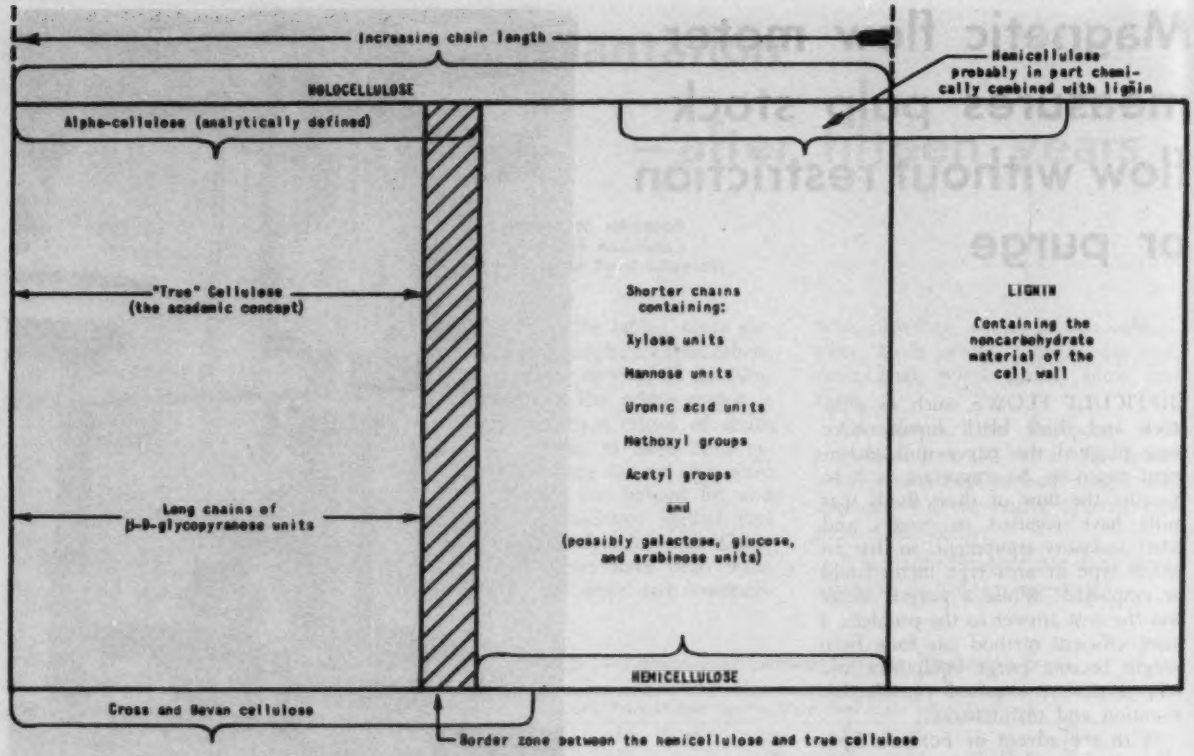
Important in pulp manufacturing applications is the fact that the instrument's calibration is independent of consistency, viscosity, density, turbulence, temperature and pressure. It "sees" any liquid that passes between two diametrically opposite electrodes set flush with the interior of the pipe. Therefore, accurate measurement is achieved without regard to the physical characteristics of the liquid, and no consideration need be given to these factors nor corrections made for them. For instance, since turbulence has no effect on accuracy, there is no need for a straight run of pipe upstream or downstream of the point of measurement, thus simplifying installation procedure.

While conductivity changes in the measured fluid have no effect on the reading obtained, there is a minimum conductivity requirement, easily met by any process flow encountered in a mill. This minimum is 200 micromhos for meters up to 6-in. line size and 50 micromhos for 8-in. and larger (200 micromhos being equivalent to 100 ppm of NaCl in pure water).

Operating on the electromagnetic principle, the transmitter itself has no moving parts—an important consideration from a maintenance standpoint. There are no transmitter adjustments to be made; no necessity for calibrating the transmitter in the field. If a change of range is to be made, it is only necessary to replace one resistor in the receiving instrument.

Construction of the transmitter is such that it can handle corrosive applications such as metering chlorine dioxide solution and other corrosive bleach plant liquids. Only two surfaces of the transmitter are contacted by the flowing liquid: the pipe itself and the electrodes. The interior of the pipe is lined with plastic to resist chemical attack; electrodes are made of corrosion-resistant metals.

It can be concluded that the development of this instrument has not only achieved accurate flow measurement of washing, bleaching, and stock preparation solutions hitherto difficult to measure, it has done so with fewer maintenance requirements and simplified installation procedure.



The hemicelluloses – their effects on pulp properties*

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BEFORE DISCUSSING the hemicelluloses in various pulps, and their possible effects on pulp properties, it might be well to decide on a suitable definition for these hemicelluloses. Any such definition is correlated with that of cellulose itself. Take wood cellulose as an example—if we are idealists and assume that all true celluloses contain only glucose units linked β-glycosidically through positions 1 and 4, then the hemicelluloses are those cell wall carbohydrates which contain all the other sugar units, irrespective of whether they are alkali soluble or readily hydrolyzed. On the other hand, if our definition is somewhat more elastic (and realistic), then within the term "wood cellulose" would be included those polysaccharides which are practically impossible to remove even on repeated treatment with alkali from a holocellulose. Most people will agree that holocellulose contains all polysaccharides of the cell wall.

When this second definition is used, the chemist must give his experimental conditions in full (i. e., strength of alkali, temperature, extraction time, etc.), so that the next man can repeat the isolation of the same cellulose and hemicelluloses. Obviously, it is difficult to draw a sharp line between true cellulose and the more resistant hemicelluloses. It is a matter of viewpoint and of semantics. What I have in mind is shown schematically in the figure. Here, the hatched border zone may belong either to "cellulose" or to the "resistant hemicellulose," depending on the views of the investigator.

Following the studies of Leech (1), and Bradway (2), Austin Anthis (3) has shown that the acetolysis of an alpha cellulose, carefully prepared from a slash pine holocellulose, gave besides glucose pentaacetate and the acetates of the usual oligosaccharides (cellobiose, cellotriose *et al*) small amounts of the acetates of a mannosidoglucose, and of a glucosidomannose, the full interpretation of which I leave to Anthis and the reader. There is at least a possibility that sugar units other than glucose enter into the architecture of this wood cellulose.

Most chemists will agree that the following carbohydrates can be included freely among the hemicelluloses of an extractive-free wood, holocellulose or chemical pulp:

(a) those that can be removed with cold aqueous alkali;

(b) which can then be flocked out by acidification and addition of alcohol to this alkaline extract, and

*Presented at the 128th meeting of the American Chemical Society, Division of Cellulose Chemistry, September 1955.

(c) which when hydrolyzed with acids give simple sugars and/or oligosaccharides and glucuronic acid derivatives.

Pulp sugars

What part of the original hemicelluloses and what sugar units persist in the various pulps?

If coniferous unbleached kraft pulps are fully hydrolyzed (and if we discount the glucose), we find regularly mannose and xylose, with subordinate amounts of galactose and arabinose (4) (5). Uronic acid groups are usually absent (6). In normal unbleached kraft pulps from angiosperms (like aspen), xylose units are always present in appreciable amounts, with very subordinate amounts of mannose and possibly arabinose; and, often, appreciable amounts of uronic acid residues.

In coniferous sulfite pulps, mannose and xylose units persist; so do uronic acids. Arabinose and galactose units are absent (4). In hardwood sulfite pulps, mannose and xylose would be present as well as variable amounts of uronic acid residues. Although we have made no studies in this field, a reasonable prognosis would be that galactose and arabinose would here, too, be absent.

Differences between sulfate

Chemical as well as physical differentiation between sulfate and sulfite pulps has been attempted—especially by Jayme (7), who prepared a kraft pulp and a sulfite pulp each retaining 3.6 per cent lignin from the same sample of spruce. Kraft showed more flexible fibers, gave less transparent sheets, was more difficult to hydrate, but eventually developed greater sheet strength than did the sulfite pulp and was much more heat-resistant than was the latter. The acidity of the kraft was lower than that of the sulfite pulp. The uronic acid content of the kraft was much lower than that of the sulfite, but the pentosan content, although considerably higher, was composed of pentosans resisting alkaline extraction. Unfortunately, no mention is made of the relative mannan content, nor were the alkali soluble hemicelluloses actually determined. Jayme formulated hypotheses regarding the distribution of both lignin and the hemicelluloses in kraft and sulfite pulps. In kraft, the hemicelluloses and lignin appeared quite regularly distributed throughout the entire cell wall (from middle lamella to the lumen). In sulfite pulps, the hemicelluloses were concentrated on the surfaces of the fibers (i.e., the outermost cell wall layers). Coniferous kraft pulp contains little or no uronide hemicelluloses and, all-in-all, less accessible hemicelluloses than does a sulfite pulp from the same species. Jayme believes that this accounts for ready fibrillation and "mucilage" formation in the latter. More recently, Giertz (8) has also compared sulfite and kraft pulps. The former was much lower in pentosans and, in general, higher in cellulose (corrected for pentosans) than was the kraft pulp. Giertz, in discussing the marked physical differences of the two types of pulp gives prominence to a hypothesis by McKinney (9). This envisions the formation during the alkaline cook of ether cross linkages in the hemicellulose components of the cell wall, which serve to anchor them in the pulp and cause retention of these resistant (9) unextractable pentosans.

Unfortunately, we have no experimental data whatsoever that such linkages do occur, and the differences between kraft and sulfite pulps remain as obscure as ever.

Time will not permit discussion in detail the nature or fate of hemicelluloses lost during the various cooks. In sulfite cooks, the hemicelluloses are converted largely into simple sugars (10), some of which are oxidized to (onic) acids (11). Early in the kraft cook, polysaccharides can still be isolated from black liquors (12); in the later stages these are converted into saccharinic acids (13).

NSSC pulps

Dr. David Lea (14), studying neutral sulfite semichemical aspen pulps, showed that these retained predominantly xylose units and insignificant amounts of galactose, mannose, arabinose, and rhamnose residues. The liquors from his cooks gave him very small amounts of a polysaccharide, which had an average number D.P. of 100-110, and which on hydrolysis gave 80 per cent xylose, subordinate amounts of glucose, galactose and arabinose, and traces of rhamnose.

In a comprehensive extension of Lea's work carried out under the direction of Dr. John Stone, Dr. Robert Quick (15) has recently completed a study on the nature of hemicelluloses removed from aspenwood in a neutral sulfite semichemical cook and of the sequence of the removal of these carbohydrates. The original aspen wood, when extracted with cold water gave very small amounts of glucose, fructose, and sucrose, and a system of polysaccharides, which, when hydrolyzed, gave largely xylose, lesser amounts of mannose, glucose, galactose, and arabinose, very small amounts of rhamnose and traces of fructose. The digestion was made with sodium sulfite and sodium bicarbonate, starting at pH 8.3 and ending, after 210 min. at pH 7.3 with a pulp yield of about 74 per cent. Both the residual pulps and the spent liquors were analyzed in a series of digestions that were stopped within 30-, 90- and 150-min. intervals. Such pulps, when hydrolyzed, showed qualitatively the same sugars as those found in the original wood (barring fructose), and all retained uronic acid residues. Glucose and xylose units predominated, although 8 per cent of the former and 25 per cent of the latter were lost during the course of the complete (210-min.) cook. In no case did the original spent liquors contain simple sugars of disaccharides, but they all contained some polysaccharides. Surprisingly enough, after a 30-min. cook (maximum temperature 64°C) when only about 0.7 per cent polysaccharides had entered the spent liquor, the dominant sugars after hydrolysis were glucose and mannose, with only subordinate amounts of xylose—this is in contrast to sugar removal during a normal neutral sulfite semichemical digestion. The overall cook had removed about 18 per cent of the original "holocellulose" and about 43 per cent of the original aspenwood lignin. Semichemical aspenwood pulp appears at least distantly related to kraft pulp; however, the destruction of the hemicelluloses is evidently much slower in a NSSC cook than in a kraft digestion.

The fate of carbohydrates in bleaching aspenwood NSSC pulps obtained in 75 per cent yield was studied by Dr. Richard Boehm (16). He was especially interested in the carbohydrate balance in the first two stages of a chlorine-caustic soda—hypochlorite bleaching operation. Boehm made a quantitative chromatographic analysis of sugars present in the hemicelluloses recovered from the bleach liquors and those still present in the fibrous residues. In the initial chlorination stage, the carbohydrate losses were very low (about 0.2 per cent of the weight of the unbleached pulp.) In the alkaline extraction, they amounted to only about 0.7 per cent, indicating that the first two steps in the bleaching operation were very gentle with regard to hemicellulosic material. On the other hand, at least 80 per cent of the initial Klason lignin in the pulp was removed. The final bleaching stage is now under investigation at the Institute of Paper Chemistry.

The favorable strength properties of high-yield, bleached neutral sulfite semichemical pulps appear to be correlated with their high hemicellulose content.

Groundwood

Another type of pulping should also be considered,—i.e. groundwood. A possible concept is that in this pulp the cell wall components remain unchanged, but this is of course an oversimplification. Hot water (extensively applied) is known to do more than to dissolve out extractives—but causes the appearance of sugar units in this extract (not given by a cold water extract) (17). I believe that hot grinding (with local heating on the pulp stone) must have its effect, however slight, on the cell wall hemicelluloses and that small amounts are probably degraded. All mechanical pulping processes have some chemical effects.

Effects of hemicelluloses on pulp properties

Only within the past 25 years have the effects on pulp properties of the hemicelluloses become gradually recognized. This recognition has resulted from the work of many laboratories, and only a relatively few of the workers can be mentioned here. In 1933 Young and Rowland (18) showed that in coniferous pulps, a correlation exists between hydration capacity and pentosan content. That same year Jonas and Rieth (19) found that xylan (and more especially mannan) contributed to tensile strength and burst of the sheeet, as well to an increase in the rate of hydration. Houtz and Kurth (20), studying the papermaking properties of a slightly modified holocellulose, showed that this pulp hydrated easily forming a sheet high in burst and folding endurance. Long beating gave glassine. In contrast, an alpha cellulose from the same sample was resistant to hydration, and its sheet strength properties were very low.

A simple correlation between total "pentosans" and pulp strength is certainly unwarranted. Much depends on the accessibility of the pentosans. For example, March (21) prepared two pulps from the same sample of aspenwood by two different methods. One was formed by a modified chlorite holocellulose procedure. This contained 18.8 per cent xylan. The other was a bleached kraft pulp containing 18.1 per cent xylan. In other words, the over-all pentosan content of the two pulps was much the same. The former, however, hydrated far more rapidly than did the latter. Its burst and tensile strengths were higher. Now, although these pulps seemed superficially similar, their total alkali soluble hemicellulose content was also different. The holocellulose pulp contained nearly 30 per cent alkali soluble hemicelluloses; the bleached kraft contained less than 13 per cent. So the alkali soluble hemicellulose content (which presumably accounts for hydration, and which augments certain strength properties of the pulp), is not necessarily correlated with the total xylan content. It is my belief that the alkali insoluble xylan—firmly held by the alpha-cellulose— takes little part in rapid hydration; whereas the alkali soluble polysaccharides may play the major role.

Jayme and various co-workers showed that both spruce and beechwood holocellulose (from which a small portion of the hemicelluloses had been removed) gave pulps with high strength properties, (especially when the lignin content was low).

Some of Jayme's most important work (22) was with hard sulfite pulps prepared under mild cooking conditions.

A chlorite-bleached beechwood sulfite showed the best over-all strength properties ["Gutezahl" (quality number) as he called it] when the pulp yields were in the range of 50-52 per cent. Such pulp then retained about 18 per cent hemicelluloses. However, all individual strength properties were not found within this yield range. The maximum breaking length and folding endurance were at a yield of 53 per cent. The maximum internal tear came at a yield of about 47 per cent. When the yield was very high (above 53 per cent) the cautious fractional removal of hemicelluloses (with 0.2 per cent NaOH) caused an increase in the "Gutezahl." When the pulp yield dropped much below 50 per cent, the "Gutezahl" decreased. There was a strong indication that hemicelluloses affected the pulp properties. Other work on the influence of hemicelluloses on pulp quality include that of Aiken (23), Obermanns (24), Ratliff (25), Schoettler (26), as well as several other contributions by Jayme (27). Whereas no one will dispute the importance of the effects of hemicelluloses on pulp properties, little attention has been focused on the specificity of certain groups in the hemicelluloses in this regard. For example, has the presence of specific groups, or has a specific configuration some bearing on such effects? Certain clues to this are already present in the work of Jonas and Rieth (19) and of Khinchin who traced increased strength properties to the presence of mannose units in the pulp.

In the work of J. O. Thompson (28) representative hemicelluloses were isolated from aspen, black spruce, Douglas fir and from slash pine. Briefly stated, the softwood hemicelluloses were found to be superior to those from aspen in improving the strength properties of handsheets.

A series of four hemicellulose fractions were isolated from the holocellulose of a slash pine. These were isolated by successive extractions with 1, 4, 7 and 16 per cent KOH, thus yielding hemicellulose fractions containing respectively 5.4, 10.2, 15.2 and 22.6 per cent mannan, and 49.5, 56.1, 48.9, and 27. 8 per cent (uncorrected) pentosans. The hemicellulose samples were too small to permit determination of uronic anhydride. Chromatographic analysis showed that besides mannose and xylose, small amounts of galactose, glucose and arabinose were also present. The average degrees of polymerization were respectively 100, 105, 120 and 130. These differences are not excessive, and it could reasonably be assumed that differences in effectiveness as beater additives would be more dependent on chemical differences than on these variations in D. P. When 5 per cent of each of these hemicelluloses was added to an alpha pulp there was a steady increase in burst, tensile and fold, and a slight steady drop in the tear factor with the addition of the hemicelluloses—ranging from that of the 1 per cent KOH extract to that obtained from 16 per cent KOH extract. Whereas this is simply one orienting experiment, the effectiveness of the hemicelluloses as beater additives in this case certainly increased with an increase in hexosan and possibly mannan content. The fractions differed in other ways too (e.g. D.P.), but these differences appear small. It was shown in separate experiments that only with marked hydrolytic degradation (i.e. great lowering of D.P.) of a hemicellulose (normally to below 100) were strength properties of a sheet seriously affected. There appears to be a threshhold value for the average number D.P. for the hemicellulose below which it is not safe to go if these are to be used as beater additives or remain effectively within the pulp. This value would have to be determined for each type of hemicellulose; it appears to be somewhat below 100. Above this point an increase in D.P. alone seems to exert little influence in improving pulp quality. Hence, in this upper range we believe that the content of a hemicellulose having a *specific* configuration may play an increasingly important role.

(Continued on page 1062)

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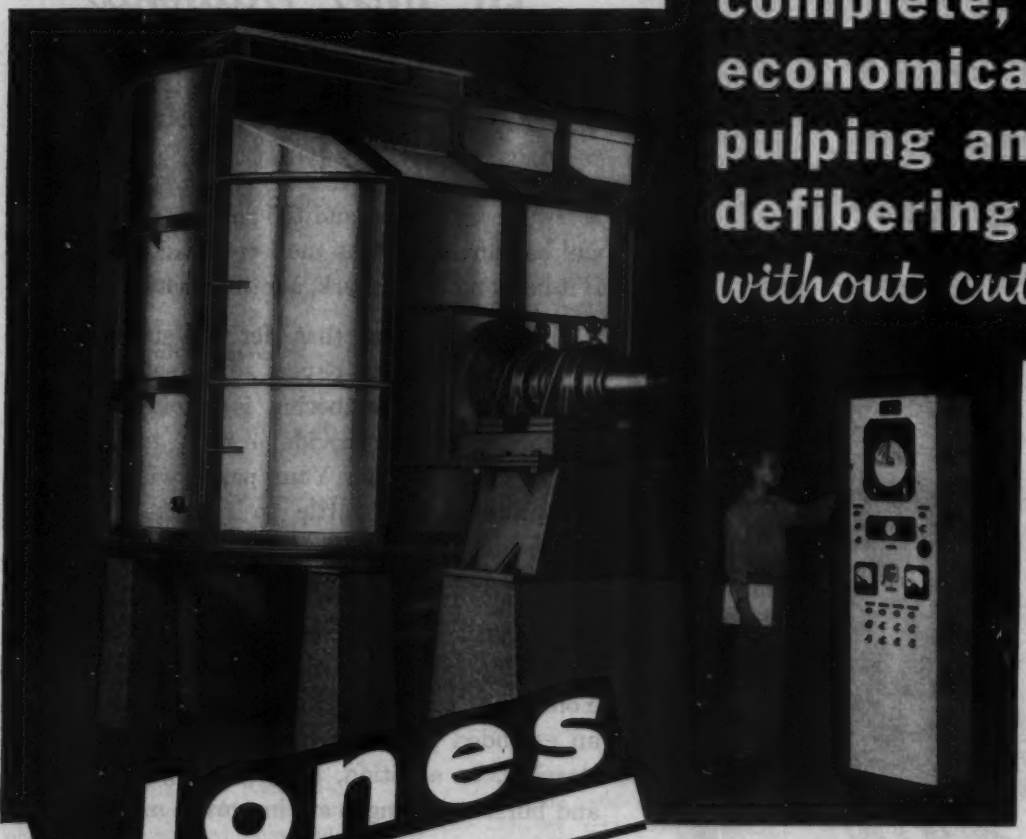


Jones HI-LO PULPER

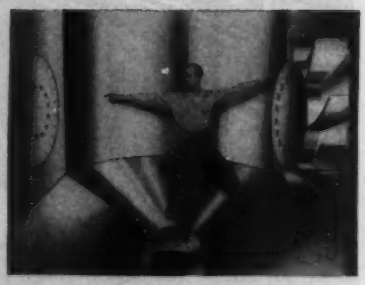
33% SAVING IN TIME

25% SAVING IN HP/TON

No longer is it necessary to accept compromise in your pulping — compromise between adequate speed and economical use of power, between maximum circulation and efficient, complete defibering.

The new Jones HI-LO Pulper is designed and engineered and *proven* able to produce maximum pulping *and* complete defibering—without cutting, without exhorbitant use of power. In actual production it has shown savings of 25% in HP/TON, 33% in pulping time.

Ask your Jones representative for details or write for Bulletin No. EDJ-1063.



Unique feature of the Hi-Lo Pulper: two separate rotors: large-vaned Lo-speed for breakup and circulation; small-vaned Hi-speed for complete defibering.

Jones

BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

NEWS of the INDUSTRY

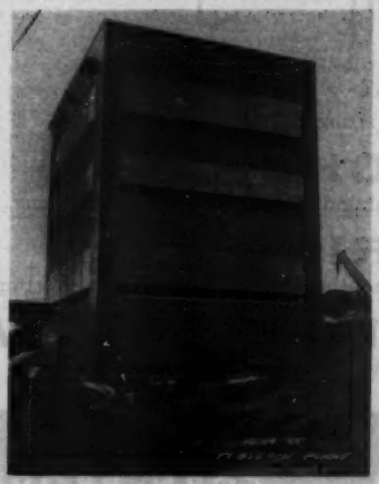
TWO OF FOUR 8- by 12-ft. Improved Machinery Inc. washers at International's new $1,000,000 bleach plant in Ticonderoga, N. Y.

MODERN INSTRUMENT panel located on the operating floor. (All instrument equipment was supplied by Fischer & Porter Co.)

International Paper Co. Building Bleach Plant at Ticonderoga

International Paper Co. is constructing a $1,000,000 bleach plant at its mill in Ticonderoga, N. Y. According to the firm, the project will further improve the quality of its Ticonderoga Offset, Ti-Opake and Ticonderoga Text papers.

The new plant has been under design and construction for more than a year and will have a rated capacity of 125 tons of bleached pulp per day, as compared with 65 daily tons in the old bleachery.



RIGHT—Exterior view of recently completed bleach plant at Ticonderoga

In addition to producing a whiter and stronger pulp, the new unit will enable the mill to use more wood grown and cut in the Ticonderoga area. This in turn will decrease the amount of outside pulp that will have to be purchased and "will give the mill even stricter control over the quality of its raw material."

Suppliers to the Ticonderoga project include: **Dowell Inc.** of Tulsa, Okla.—acid cleaning; **Hammond Iron Works** of Warren, Pa.—tanks and tower shells; **Johns-Manville**—pipe and tank insulation; **Pittsburgh Plate Glass Co.**—glass installation, and **Stebbins Engineering & Mfg. Co.** of Watertown, N. Y.—linings and tile work.

Thilmany to Add Seventh Machine at Kaukauna

Purchase of a new paper machine has been announced by Thilmany Pulp & Paper Co. of Kaukauna, Wis. The unit, which will be the firm's largest, will bring the Thilmany total to seven.

The 165-in. Black-Clawson Co. fourdrinier Yankee will turn out high-quality kraft specialty MG paper. It will trim 147 in., operate at speeds of up to 1200 fpm and will feature a 15-ft. diameter by 168-in. face Yankee dryer, believed to be the largest such unit ever to be contemplated for operation in the United States. The dryer will be constructed of high-tensile alloy cast iron to provide a highly polished drying surface.

To facilitate quick wire change, the fourdrinier part will cantilever from the backside. A 36-in. diameter Black-Clawson-Downingtown cantilever suction couch will also be furnished. A single suction dual press comprises the press part.

The dryer part will boast a 60-in. pre-dryer section, a 6-ft. diameter lead-on dryer, the giant Yankee and a 60-in. diameter after-dryer section. The Yankee dryer is to be equipped with a pressure roll of B-C crownless design.

A single openside calender, an Autoflyte "36" automatic reel and a Model 30 slitter-rewinder comprise the balance of the machine.

In addition to the paper machine, Thilmany has ordered a Babcock & Wilcox Co. cyclone boiler that will deliver about 200,000 lb. steam per hour at 600 psi.

With the added production from the new paper machine—scheduled for operation in June 1957—and

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auxiliary equipment, it is expected that Thilmany's production of pulp and paper will be brought into balance in 1959.

Rolland Paper Plans Extensive Expansion

Rolland Paper Co. Ltd. will borrow $5,500,000 to be used largely for expansion at its mills in Mt. Rolland and St. Jerome, Que. A recent vote by shareholders gave the Montreal firm authority to borrow as much as $10,000,000.

It is understood that the initial expenditure will involve an estimated $4,650,000. This will include the cost of a new paper machine, buildings and secondary equipment.

The paper machine is to be installed at St. Jerome and will have an annual capacity of between 15,000 and 18,000 tons.

At the present time the St. Jerome mill produces about 18,000 annual tons of high-grade rag stock and sulfite bond papers, while the Mt. Rolland output is approximately 15,000 tons. According to the firm, the new capacity will increase over-all production by 50 per cent.

Rayonier Will Build Tall Oil Plant at Jesup

Rayonier Inc. will build a tall oil plant at its chemical cellulose operation in Jesup, Ga. (Tall oil is a silvichemical derived from wood that is finding increasing uses in the paint, soap, paper, rubber, textile and chemical industries.)

Rayonier has entered into an arrangement with Hercules Powder Co., under which much of the crude tall oil produced at Jesup will go to the Hercules plant at Savannah for processing into a variety of refined products.

Dierks to Build in Pine Bluff Area

Dierks Lumber Co. will build a paper mill near Pine Bluff, Ark., designed for a daily production of 150 tons. Dierks operates lumber mills in Arkansas and Oklahoma.

The plant — Dierks' first paper manufacturing venture—will produce linerboard or wrapping paper or bag paper—or all three. It will employ more than 100 persons.

ARTIST'S CONCEPTION OF multimillion dollar paper mill that will be built at Anniston, Ala., by National Gypsum Co. The 115,000-sq. ft. plant will produce a daily 200 tons of paper. Included in the project is a 7000-sq. ft. two-story office building. The paper output will be used to cover gypsum wallboard products made at Gypsum plants in Westwego, La.; Savannah, Ga.; Shoals, Ind.; Baltimore, Md., and Burlington, N. J.

National Gypsum Alabama Mill Under Construction

Foundations have been poured for National Gypsum Co.'s new multimillion dollar paper mill in Anniston, Ala. The totally-enclosed plant is expected to be in operation by July.

The mill itself will encompass an area of 155,000 sq. ft. within the 45-acre site. Some 7000 sq. ft. will be devoted to office space. The one-story structure will be of steel frame with simple exterior walls of Dri-wall tile masonry. Precast concrete slabs will support a 20-year bonded built-up roof.

Based on the use of waste paper for a daily production of 200 tons, the mill will produce paper used for covering Gypsum's wall board. Scrap paper will be gathered in the Anniston, Birmingham, Atlanta and Chattanooga areas.

The pulping operation will consist of the repulping of waste paper. Six Miami jordans will be used preceding the paper machine. Seven concrete chests will be constructed for stock storage.

Architect for the project is John J. Harte Co. of Atlanta. General contracting firm is Daniel Construction Co. of Birmingham.

Construction is to begin in the spring, with completion set for September of next year. Company officials declined to estimate the cost of the proposed plant, but the cost of the 1480-acre plant site was about $250,000.

The mill is to be designed by Rust Engineering Co. of Pittsburgh and will include five buildings, the largest of which will be 650 by 80 ft.

Bowater Orders Five Newsprint Carriers

Orders for five ocean-going vessels have been placed with British shipyards by Bowater Steamship Co. Ltd., a subsidiary of Bowater Paper Corp. Ltd. of London. The cost of the ships will approximate $9,800,000.

The orders form part of Bowater's program of fleet replacement, many ships of which were lost in World War II, while others have been scrapped as obsolete.

Two new newsprint carriers, the *Sarah Bowater* and the *Margaret Bowater*, are already in service, and a third ship is due for delivery next year. (See THE PAPER INDUSTRY for December 1955, page 856.)

Specially designed for the transport of pulpwood, wood pulp and newsprint, the five vessels will be principally engaged in carrying raw materials from Canada, the United States and Scandinavia to Bowaters mills in England. Each of the ships will be diesel-powered and will be 4750 tons deadweight.

Hudson P&P to Build in New Jersey

A 9-acre plot in Carteret, N. J., will be the site of Hudson Pulp & Paper Corp.'s first paper cup and container plant. The new converting unit is scheduled for completion this summer. It is regarded as a pilot operation. Additional production plants at Carteret are contemplated for the future.

The total cost of land, building, machinery and other equipment, ac-

MILL OF W. C. Hamilton & Sons in Miquon, Pa., which is celebrating its 100th anniversary in 1956

NEWEST PAPER machine at the Miquon mill is one of seven operated by the firm at its Pennsylvania location

W. C. Hamilton Marks 1956 as Centennial Year

The 100th anniversary of its founding is being marked in 1956 by W. C. Hamilton & Sons of Miquon, Pa. The exact date of the founding of the fine paper mill on the banks of the Schuylkill River has not been determined because some of the firm's early records have been lost. Thus, the entire year is being observed.

The company's volume today is a far cry from the small business undertaken by William Hamilton in 1856. Sales in 1955 amounted to approximately $17,000,000—or 95,000,000 lb. of paper. (At the same time, sales of Michigan Paper Co. of Plainwell, a wholly-owned subsidiary, came to about $6,000,000—or 49,000,000 lb.

The first Hamilton mill in Miquon —Indian name for William Penn —was a handmade paper operation. The original small production serves as a contrast to the present plant's daily capacity of 350,000 lb.

William Hamilton established his first mill not far distant from the Rittenhouse plant in Philadelphia—America's first paper mill. He had received his early training at the Wilcox Ivy mill at Glen Riddle, Pa.

An Historic Site

The present W. C. Hamilton mill stands at the site where in the latter part of the 18th century Henry Katz established the first paper mill in the Schuylkill Valley.

Next to build a mill in the valley was John Hagey, who had learned papermaking in the Katz mill. His plant stood on the site of the present mill's superintendent house.

In 1876—just 20 years after its founding—the W. C. Hamilton firm took part in Philadelphia's Centennial Exhibition. At its display in Machinery Hall—under the supervision of Charles L. Hamilton—there was printed on a Campbell Press on paper made on the spot a book entitled "Uncle John's Centennial Story."

Descendants of the Pioneers

Today, the most modern machinery and equipment are used in the manufacture of Hamilton papers. But, tradition is still an important part in operations. Many of the 700 employees are descendants of the pioneer papermakers who brought the art to eastern Pennsylvania.

Since 1929 the Hamilton mill has more than tripled its output. It is today the largest manufacturer of business papers in the United States, and its offset, text and cover papers are constantly increasing in volume.

The company operates 10 paper machines.

News of the Industry . . .

cording to informal estimates, will be "just under $2,000,000."

According to William Mazer, president of Hudson Pulp & Paper, the plant will be the most modern cup and container installation in the country. A one-story building encompassing manufacturing, warehousing and office space, it will have provisions for an "ultra-modern" quality control laboratory and completely mechanical materials handling operations.

Hudson's new Paper Cup & Container Div. is the latest step in a far-reaching expansion program launched a decade ago. The firm owns and operates mills in Florida, Vermont, Maine, West Virginia, Arkansas and North Carolina.

U. S. Awards West Va. P&P $1,084,998 in Wartime Damages

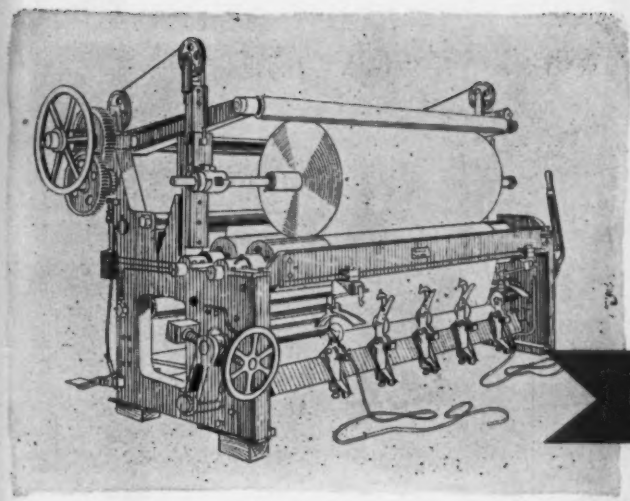
Award by the United States Court of Claims recently of $1,084,998.54 in settlement of damages suffered by West Virginia Pulp & Paper Co. when the government seized its Cooper River leasehold during World War II has ended eight years of litigation. The award was announced by the court in Washington, D. C.

The million-dollar judgment resulted from a ruling by the Court of Claims nearly three years ago that the government must compensate the company for the "taking of its property." The court at the time ordered a commissioner to determine the amount of the award.

The recent judgment, however, resulted not from the commissioner's findings, but from an offer by the company to accept from the government the amount fixed in the order.

The property in question was acquired by the government during World War I and deeded to the city by statute in 1936. The deed contained a national emergency reverter clause. The city immediately leased the riverfront property to West Virginia Pulp & Paper, which invested $11,000,000 in improvements on it.

When World War II broke out,



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the government exercised its reverter clause privileges and took the property. It offered no compensation to the paper firm, which was compelled to remove and relocate machinery, equipment, stores, offices and other property and personnel at what the court said was "substantial cost and expense."

Quebec North Shore Joins British Firm in Aluminum Development

In the multimillion dollar primary aluminum project at Baie Comeau, Que., British Aluminum Ltd. and Quebec North Shore Paper Co. are cooperating in the extensive development of one of Canada's most vital minerals.

The firms are forming a new Canadian corporation, Canadian British Aluminum, which will headquarter in Montreal. The deal gives a majority interest to the British firm, with a minority interest going to Quebec North Shore.

There is an additional partnership involved in connection with Manicouagan Power Co., a wholly owned subsidiary of Quebec North Shore. British Aluminum is to get a minority interest, while the paper firm will retain control.

Through this arrangement, British Aluminum will retain a principal interest in its field—that of aluminum, while Quebec North Shore will hold its key interest in the field of power.

The $130,000,000 primary aluminum plant will have a capacity of 160,000 long tons of ingot by the target date of 1965. This will be arrived at in four equal stages of 40,000 tons each.

Utilization of Latin American Hardwoods Studied at U.S. Laboratory

Officials of Container Corp. of America and the Colombian government conferred recently at the U. S. Forest Products Laboratory in Madison, Wis., on more effective utilization of Latin American hardwoods in the pulp and paper industry. (During the past several years the Laboratory's Division of Pulp & Paper has conducted extensive tests on hardwoods from south of the border.)

Although Colombia has vast timber resources, its pulp and paper industry is small.

Recent investigations at the Laboratory have shown that by using various means of pulping, including the groundwood and semichemical processes, it is possible to make satisfactory newsprint, wrapping and writing papers, as well as insulating board and hardboard, from Latin American woods.

A similar experiment conducted for the Chilean government following World War II has led to a large expansion of the Chilean pulp and paper industry.

Paper Firms Gain Strong Foothold in Chemical Production

PAPER MANUFACTURERS are getting into the chemicals business in a big way through the utilization of by-products.

In a recent article by David Morgenbesser in the New York *Journal of Commerce* it was reported that the move is already adding a substantial chunk to the thriving sales volumes of many papermakers. Additional capacity now being installed gives promise of further gains this year.

At least equally important, utilization of by-products is helping paper firms lessen stream pollution.

And diversification, now looming large in the minds of papermakers, is also being furthered by the addition of such products as tall oil, lignin, activated carbon and dimethyl sulfide —all derived from by-products of pulp production.

"While chemical operations do not as yet constitute a major share of the business of most paper companies," the *Journal* reports, "they are still far from being a drop in the bucket."

$7,000,000 for West Virginia

West Virginia Pulp & Paper Co., for instance, is realizing about $7,000,000 annually—or more than 5 per cent of sales—in such by-products of pulp as activated carbon, which is used in purifying water, tall oil, and lignin.

And further gains over the next two years are likely.

International Paper Co. recently completed a $2,000,000 expansion program at the Panama City, Fla. plant of Arizona Chemical Co., which is jointly owned by International Paper and American Cyanamid Co. The plant draws on seven International Kraft mills for its raw materials and turns out such products as tall oil, tall oil fatty acids and tall oil rosins.

Not to be outdone, Union Bag & Paper Corp. is also constructing a $2,000,000 tall oil plant that will utilize the by-products of its kraft operations.

Tall Oil Boom

Tall oil, used in such products as detergents, linoleum, printing inks and rubber chemicals, is a rapidly mushrooming segment of the chemical business, with production during the first eight months of 1955 at around 350,000,000 lb., about equal to that for all of 1954.

According to Dr. Arthur Pollock, technical consultant in the tall oil division of the Pulp Chemicals Association, output by the end of this year will reach 500,000,000 lb. of crude tall oil.

Dairy Feed Additive

Major progress in the field of agricultural applications for mill wastes has been made by Marathon Corp. During the past four years, this firm has field tested an experimental dairy feed additive derived from purified lignosulfonates from sulfate waste liquor.

The additive, called "Maracarg NC," is said to show promise as a preventative against ketosis, a cattle disease. Limited quantities are expected to be test marketed shortly.

And on the West Coast, Crown Zellerbach Corp. is experimenting with "Conidendrol," a product obtained from hemlock waste liquor that is used in the preservation of rubber, fats, edible oils, and a variety of other products. The firm is also looking into the possibility of using the product in paper materials used to package food products susceptible to rancidity.

CZ has already made sufficient progress in techniques for producing dimethyl sulfide from sulfate black liquor and is building capacity for the production of 2,000,000 lb. annually.

To help reduce stream pollution, Charmin Paper Mills Inc. of Green Bay, Wis., recently completed a $3,200,000 plant for manufacturing yeast from sugars cooked out of wood in the pulping process.

Familiar Ground

Concluding its round-up of the chemicals picture, the *Journal* declared, "In venturing into the chemicals field, paper manufacturers are on familiar ground. This is one of the reasons why they feel that current ex-

pansion in this direction is likely to prove successful.

"It has been estimated that paper companies spend around $250,000,000 a year on chemicals. For every ton of paper — other than newsprint — it has been estimated that about 500 lb. of chemicals are used in various stages of production.

". . . Paper companies also view their entrance into the chemical field as a way of offsetting any possible loss in markets to what David L. Luke, president of West Virginia Pulp & Paper Co., has termed 'films, foils and plastics.' "

Recent Expansions in the Industry

Scott Paper Co.
of Chester, Pa., has been granted the right to purchase—over the next 22 years—the entire production of B. C. Forest Products Ltd.'s projected $36,000, 000 mill at Crofton on Vancouver Island. Construction of the huge pulp plant is scheduled to begin early this year. Annual output will be approximately 145,000 tons. Scott proposes to purchase 1,000,000 shares of the Canadian firm at $15. It will purchase the stock over a 25-month period and buy an undisclosed minimum amount of the pulp output.

Price Bros. & Co. Ltd.
will build a $10,000,000 power plant at the mouth of the Shipshaw River in northern Quebec. The plant, which will include a dam, will have a potential capacity of 50,000 to 60,000 hp and will replace facilities at Murdock Falls.

Container Corp. of America
has agreed to purchase, subject to zoning, a 48-acre tract near Seattle. Construction of a $925,000 plant will begin in April, with completion expected by the end of the year. Folding carton production will be transferred to the new operation from its present location at Seattle.

Marathon Corp.
of Menasha, Wis., has announced plans for the installation of unprinted food package manufacturing facilities in a leased factory building at Newnan, Ga. Production of plain, unprinted cartons for the frozen food and other food package industries is expected to begin in the fall. The unit is the first manufacturing plant to be placed in operation by Marathon in the Southeast.

Hankins Container Co.
has completed a $250,000 expansion program at its Litle Rock, Ark. corrugated container plant. The company plans to spend an additional $1,000,000 at the plant over the next three years.

American Tube & Paper Co.,
a division of American Paper Products Co. of Philadelphia, has established a plant at Totowa, N. J., to serve the New York metropolitan area. The operation is equipped with completely modern facilities for the manufacture of paper tubes and cores for the textile, paper and plastics industries.

West Tacoma Newsprint Co.
of West Tacoma, Wash., has recently installed a 30-ton Black-Clawson Co. pulpwood grinder and a second Bauer Bros. Co. 12-ton refiner. According to Neil Robertson, mill superintendent, newsprint production at the plant is now estimated at an annual 58,000 tons; by this summer production is expected to increase to the 62,000-ton level.

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Belleville, N. J.

News of the Industry . . .

Albemarle Paper Mfg. Co.
of Richmond, Va., will set up a new corporation to consolidate its multi-wall bag plant in Richmond with the recently purchased Raymond Bag Co. of Middletown, Ohio. The new organization will be known as Raymond Bag Corp. with headquarters in the Ohio city.

Champion Containers Inc.
at Plymouth, Mich., has been organized as a wholly owned subsidiary of Ohio Boxboard Co. of Rittman, Ohio. The new firm has acquired the plant and other assets of Champion Corrugated Container Corp. and will manufacture and sell corrugated containers in the Detroit area.

American Box Board Co.
plans to erect an office building in Grand Rapids, Mich. Designed to house the executive and general office staff, it will release much needed space at the firm's manufacturing operation in the Michigan city.

Bohemia Lumber Co.
at Culp Creek, Ore., is replacing old equipment with a modern bandsaw plant, whole-log barkers and two new chippers to reduce logs and mill waste to chips for use in the manufacture of pulp.

Mulgrave, Nova Scotia
is the site of an engineering survey aimed at determining whether a $35,-

A NEW CONTINUOUS winder has been added to the famous "Big Bertha" diazo coating machine at the Ozalid Div. of General Aniline & Film Corp. in Johnson City, N. Y. The winder, a Dilts Model No. 42, designed and built by the Dilts Div. of the Black-Clawson Co., is a two-arm rotating type with the patented Kohler system flying starter. The unit replaces a Pope type drum winder. Tension control is through a Reliance current-regulating winder motor, which will wind either constant or tapered tension

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000,000 paper mill will be located in the vicinity. It was announced in October that Scott Paper Co. of Chester, Pa., would make a similar survey in the Strait of Canso area.

Hinde & Dauch Paper Co.
has begun production at its new corrugated box plant in the Fairfax Industrial District of Kansas City. The factory will produce a full line of corrugated and solid fiber shipping boxes, merchandising packages and displays. Doubling the production capacity of its old plant in Kansas City, Kan., the new operation boasts a new block-long corrugating machine capable of producing 7 miles of 7-ft. corrugated board every hour. The machine is capable of switching from one order to another without stopping. Other machines print and slot corrugated shipping boxes at rates of more than 15,000 per hour.

Rayonier Inc.
at Hoquiam, Wash., has completed the modernization of pulp finishing room facilities. Included are a pulp cutter, conveying equipment and turnover bales. The high-speed cutter was supplied by Lamb-Grays Harbor Co. Inc. Pushbutton controlled, it is designed for cutting two 5½-ton jumbo rolls simultaneously, producing accurately sized sheets at a maximum speed of 528 fpm.

International Paper Co.
will build a plant for the manufacture of Pure-Pak paper milk containers at Turlock, Cal. The unit, which will serve eight western states, will have a rated monthly capacity of approximately 20,000,000 milk containers of all sizes.

Restigouche Co. Ltd.
of Cambellton, N. B., a subsidiary of Fraser Companies Ltd., has an expansion program underway that will include a new boiler house, two new boilers, an office bulding and pulp-cleaning equipment.

Miami National Container Corp.
has broken ground for construction of an 110,000-sq. ft. corrugated paper box plant in Miami, Fla. A subsidiary of National Container Corp., the firm will expand production of paper boxes for the citrus industry in the Homestead Redlands area.

Weston Paper & Mfg. Co.
of Dayton, Ohio, plans the construction of a $2,500,000 corrugated box plant in Chicago.

Sidney Roofing & Paper Co. Ltd.
of Victoria, B. C., will build a $5,000,000 plant in South Burnaby. The firm manufactures roofing products from a wood pulp base.

Stone Container Corp.
of Chicago has purchased for cash the assets of Western Paper Box Co. of Detroit, a manufacturer of folding cartons, set-up boxes and corrugated boxes. Western Paper Box will continue under the same name as a Stone subsidiary, with no personnel or operations changes contemplated. According to Stone, the acquisition will add an estimated $2,000,000 to the parent firm's annual sales volume.

Growers Container Corp.
of Salinas, Cal., is building a plant at Jacksonville, Fla., for the manufacture of fiberboard shipping containers—particularly for fruits and vegetables. The operation will have an annual capacity of 35,000,000 containers, with initial production expected by mid-

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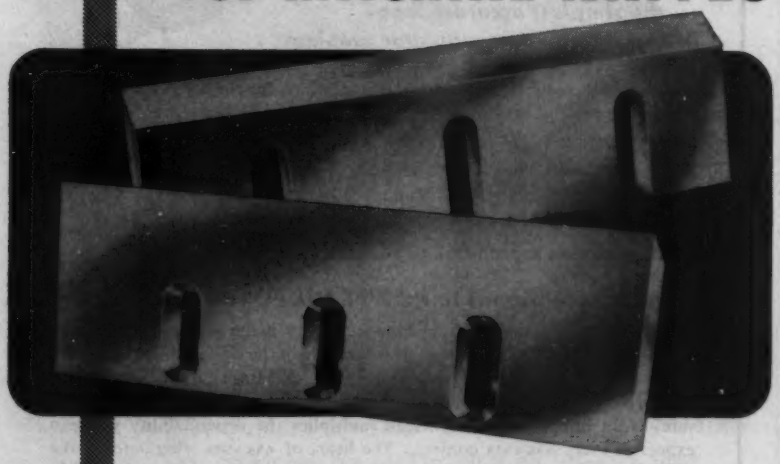

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summer. The plant will be near the St. Regis Paper Co. mill (now being expanded to more than triple its capacity), which will supply a major portion of Growers Container's raw material. The high-speed machinery will consist of an 87-in. corrugator with three sets of 36-in. double preheaters plus a bridge preheater capable of running "A" or "B" flute cases at speeds of more than 100,000 sq. ft. per hour, two 35- by 78½-in. and one 60- 140-in. printer-slotters, several semi-automatic stitchers, a semi-automatic taper and two automatic folder-tapers.

LaPapeterie Nationale
is the name of a newly organized paper mill in Berthier, Que. The existing plant—a match factory formerly operated by Eddy Match Co.—is now the property of a group of financiers, who will control the paper operation.

Western Waxed Paper Div.
of Crown Zellerbach Corp. has announced that bids have been called for construction of a 72,250-sq. ft. addition to its North Portland, Ore. plant. The 240- by 301-ft. structure will be used for warehousing and for future expansion.

Lewis Container Co.
has announced that the firm name has been changed to American Box Board Co. Inc., and that the new container plant being completed in Madison, Wis., will be a branch operation in the company's facilities. Following the company's recent merger with American Box Board Co. of Grand Rapids, Mich., its container plant at Colby, Wis., was extensively expanded, and the administrative and sales offices were moved from Colby to Wausau.

Record Year for Packaging Predicted by Greenway

A record year for packaging generally and for folding cartons specifically is forecast by Norman F. Greenway, president of the Folding Paper Box Association of America.

Greenway predicts that total industry volume in 1956 will increase 10 per cent to close to $900,000,000, absorbing a total of 2,500,000 tons of boxboard. Over-all, he said, America will use 100 billion folding cartons to

What, actually, do Vacuum Pumps on paper machines handle?

Paper mill engineers know that it is actually a mixture of air and water vapor, but the custom of rating vacuum pumps in terms of air capacity alone causes this important fact to be frequently overlooked.

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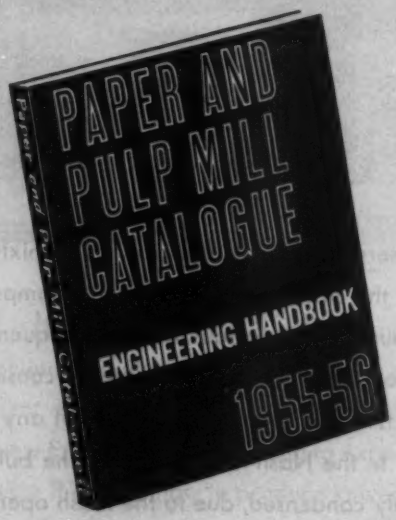

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preserve, protect, carry and sell almost every type of product.

"More and more retailers of all types are turning to self-service and self-selection to increase sales and cut costs," Greenway declared. "In this modern, super-market style of selling, the package has become the salesman as well as the container."

Nekoosa-Edwards to Add Chlorine Dioxide Stage

Plans for the addition of a chlorine dioxide stage to the Nekoosa, Wis. mill bleach plant have been announced by Nekoosa-Edwards Paper Co. The project is designed to improve the brightness of sulfate pulp.

The new equipment is to be installed in an existing building. However, a small building is to be constructed near the present bleach plant to house a chlorine dioxide generating unit. An accompanying feature is the enlargement of the Nekoosa mill filter plant to provide about 25 per cent additional pure water.

Other improvements include the installation of two new digesters at Nekoosa to replace two older units. Each new digester has a capacity of 3600 cu. ft.—or about 8 tons.

Coming Events

Tappi

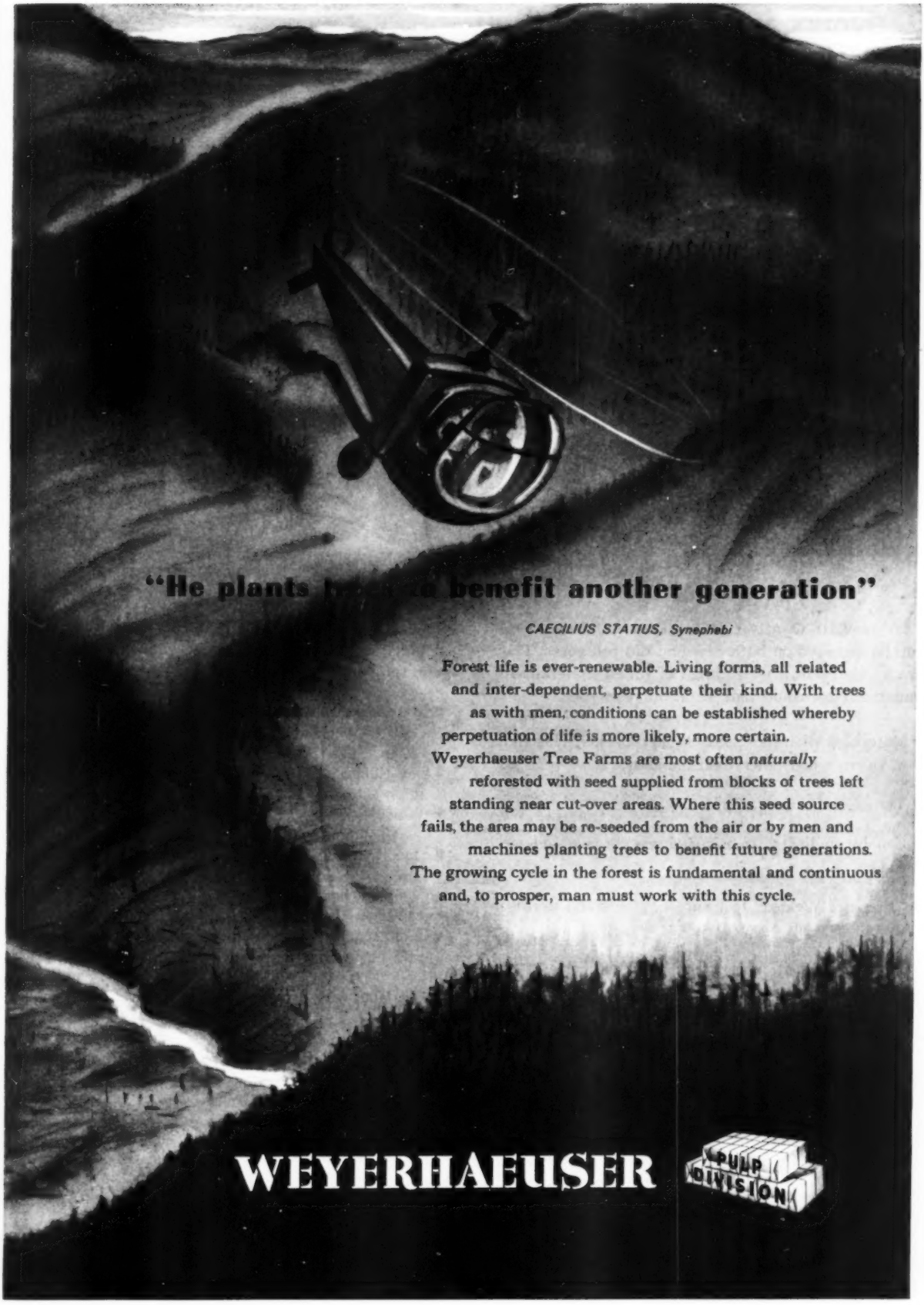
Feb. 20-23—Annual Meeting, Hotel Commodore, New York, N.Y.
March 13—Lake States Section, Appleton, Wis.
March 23-24—Southeastern Section, Roosevelt Hotel, Jacksonville, Fla.

American Pulp & Paper Mill Superintendents Association

Feb. 23—Miami Valley Division, Manchester Hotel, Middletown, Ohio
March 15—Michigan Division, Hotel Harris, Kalamazoo, Mich.
March 22—Northwestern Division, Appleton, Wis.
March 23—Miami Valley Division, Manchester Hotel, Middletown, Ohio

Other meetings

Feb. 19-24—APPA Annual Meeting, Waldorf-Astoria Hotel, New York, N.Y.
March 1-2—Forest Products Research Society, Eastern Canadian Section, Royal York Hotel, Toronto, Ont.
March 8-9—American Institute of Electrical Engineers, conference on electricity in the pulp and paper industry, University of Florida, Gainesville


"He plants [illegible] benefit another generation"
CAECILIUS STATIUS, Synephebi
Forest life is ever-renewable. Living forms, all related and inter-dependent, perpetuate their kind. With trees as with men, conditions can be established whereby perpetuation of life is more likely, more certain.
Weyerhaeuser Tree Farms are most often naturally reforested with seed supplied from blocks of trees left standing near cut-over areas. Where this seed source fails, the area may be re-seeded from the air or by men and machines planting trees to benefit future generations.
The growing cycle in the forest is fundamental and continuous and, to prosper, man must work with this cycle.
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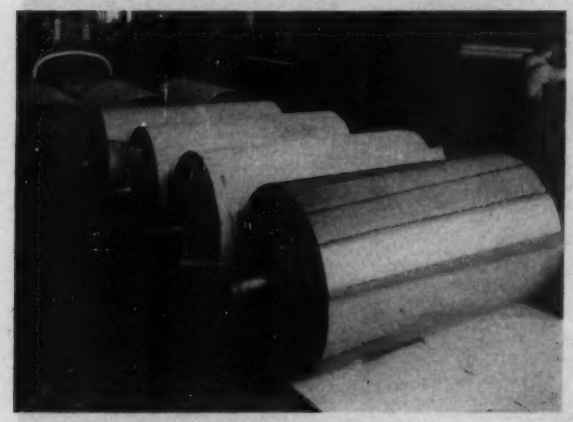

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- Write for bulletin T-454.

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ALLIED NEWS

F. C. Huyck & Sons Building New Mill

Construction of a new F. C. Huyck & Sons felt mill, the largest in the South, is expected to be completed at Aliceville, Alabama, in May. A part of Huyck's expansion program, the new plant represents an investment of over $4,000,000 and will employ about 300 people. C. W. LaDow will manage the mill, which will provide needed space for new products currently in development.

Beloit Eastern Expands

Beloit Eastern Corp., Downingtown, Pa., plans a major expansion for 1956. New buildings will include a new machine shop area and a larger erecting shop. The present erecting shop will be converted into a complete welding department. A shipping and receiving building with two inside railroad sidings and a truck entrance will adjoin the new buildings.

Ten new heavy machine tools and additional foundry equipment, including a complete new system for preparing casting sand, will be installed.

Beloit recently assumed ownership of the plant from Downingtown Mfg. Co.

Research and Development Program at Pusey & Jones

A program of expanded research and development has been initiated by Pusey & Jones Corp., Wilmington, Del., designed to effect savings in operation throughout the entire line of Puseyjones papermaking machinery. Users of these machines now have available to them a corps of experts trained in the solution of technical difficulties and in the development of engineering refinements in the papermaking field. The staff of this department will concentrate on new products and the improvement of present products.

The company has also reorganized its staff of sales engineers, dividing the United States into five territories, with a man assigned full time to each.

Du Pont Plans Increased Production of Two Items

Expansion of Du Pont's Edge Moor, Del., and Baltimore plants will increase the company's production of titanium dioxide by over 25 per cent, according to F. H. Weismuller, general manager of the pigments department. The white pigment, widely used in paint, paper and plastics, is currently in short supply.

NEW INSTRUMENT training center of Foxboro Co., Foxboro, Mass., scheduled for completion early this year will double capacity for training customers' men who enroll in the various courses of instruction. Nearly twice as many courses will be offered, including specialized training in electronic instruments and advanced forums for various industry groups, as well as the standard three-week general courses.

The first stage of expansion at Edge Moor will be completed by autumn of 1956; the second stage and the Baltimore project are scheduled for completion in 1957. The company is also conducting engineering studies on a new titanium dioxide plant near New Johnsonville, Tenn., which may be in production in 1958.

At Du Pont's Niagara Falls, N. Y. plant a $550,000 project to increase production of "Elvacet" polyvinyl acetate emulsion will be completed during the latter half of 1956.

The growing demand for water base paints has increased the need for the emulsion which is also widely used in the manufacture of adhesives for paper products, in textile finishes and in grease-proof and grease-resistant paper coatings and sizes.

Allied News Briefs . . .

General Chemical Div., Allied Chemical & Dye Corp. has started construction of a plant for the manufacture of liquid aluminum sulfate at Hopewell, Va. The plant will be in operation early in 1956, supplying municipal and industrial water and sewage treatment plants and pulp and paper mills in the area.

Minerals & Chemicals Corp. of America and subsidiary companies, **Speedi-dri Corp., Porocel Corp.** and **Minerals Separation Div.,** have removed their entire Philadelphia, Pa., and Metuchen, N. J. operations to Menlo Park, N. J. Research facilities at Camden, N. J., Carlsbad, N. M., Lakeland, Fla., and McIntyre, Ga., were also moved to the new Minerals Research Center at Menlo Park.

Valley Iron Works, Appleton, Wis., has purchased a new hydraulic press brake from Pacific Industrial Mfg. Co. The 500-ton unit is now installed in the company's older shops and will be moved into a new addition when construction is completed.

Construction of the new **Albany Felt Co.** plant in St. Stephen, S. C., is expected to be completed by the end of March. It will be the first complete mill for the manufacture of paper machine felts in the South.

Vapo Systems Inc., Villa Park, Ill., makers of paper conditioning equipment, will be represented by Brookover Anderson Inc., Andover, Mass. sales engineers, in all the New England states, New York, northern Ohio, Pennsylvania, New Jersey and northern Virginia.

Integration of the Canadian operations of **Dorr-Oliver Inc.** with those of **E. Long Ltd.** of Orillia, Ont., was effected the first of the year. The new organization, Dorr-Oliver-Long Ltd., has headquarters in Orillia and is headed by Clarence R. Long, who was a director of Dorr-Oliver and president of E. Long.

Heppenstall Co., Pittsburgh steel forgings manufacturer, will purchase the physical assets of **Midvale Co.** of Philadelphia, subject to approval by Midvale's stockholders. The merger would make Heppenstall the nation's largest manufacturer of heavy forgings. The new owners would spend about $2,500,000 in renovating and converting the Midvale plant, which plays a major role in heavy ordnance production.

Cameron & Barkley Co., distributor of industrial supplies in the states of South Carolina, Georgia and Florida, has been appointed distributor of **Blaw-Knox** electroforged steel gratings and treads.

NAMES *in the* NEWS

R. M. Sensenbrenner Retires from Whiting

After 35 years with George A. Whiting Paper Co., Menasha, Wis., R. M. Sensenbrenner, vice president, general manager and director, retired last month. George A. Whiting, president and treasurer, took over the general management duties.

Mr. Sensenbrenner came to Whiting in 1921 as secretary. He had formerly been with Menasha Paper Co., a forerunner of the present Marathon Corp.

New VP at Consolidated

J. A. Michaud has been elected vice president in charge of woodlands of Consolidated Paper Corp. Ltd., Montreal. He was formerly general wood manager and replaces François Faure who is retiring after 51 years with the company. Mr. Faure will continue as counsellor and director.

Mr. Michaud has been associated with Consolidated and its affiliates for 35 years. He is now president of St. Maurice River Boom & Driving Co.

Donnacona Announces Changes

T. G. Shepherd, former groundwood superintendent of Donnacona Paper Co. Ltd., Donnacona P.Q., has been appointed production superintendent, Pulp & Paper Div. He will be replaced by T. Dobson, who has been chief chemist, and G. Baker will take the position vacated by Dobson.

CPPA Div. Elects Chairman of Executive Committee

At the annual meeting of the Western Div., Canadian Pulp & Paper Association, in Vancouver, Clifford Crispin, vice president of MacMillan & Bloedel Ltd.'s Pulp Div., was elected chairman of the executive committee. He will succeed M.J. Foley, president of Powell River Co. Ltd. Members of the committee are: W.E. Breitenbach, Alaska Pine & Cellulose Ltd.; L.L. G. Bentley, Canadian Forest Products Ltd.; Wentworth Brown, Columbia Cellulose Co. Ltd.; Frank N. Youngman, Crown Zellerbach Canada Ltd.; J.A. Young, Elk Falls Co. Ltd.; B.M. Hoffmeister, MacMillan & Bloedel; Harold S. Foley, Powell River.; J.A. Craig, Sidney Roofing & Paper Co. Ltd.; E.M. Herb, Westminster Paper Co. Ltd.; M.J. Foley, and Leander Manley, CPPA.

Clifford Crispin

G. A. Pitman

C-Z Appoints Food And Packaging Expert at Western Waxed Paper

Gilbert A. Pitman has joined the staff of the Packaging Research & Development Laboratory of the Western Waxed Paper Div. of Crown Zellerbach Corp., San Leandro, Cal. His 27 years of experience associated with the food and packaging industries as food technologist and packaging engineer will complement the services previously offered by the laboratory. Mr. Pitman was formerly executive officer and secretary of the Western Fresh Fruit & Vegetable Container Institute, a non-profit trade organization which dissolved in August 1955. In his new position he will conduct liaison between customers food technologists and laboratories and the Packaging Research & Development Lab.

Kimberly-Clark Vice President Retires

Charles H. Sage, vice president of Kimberly-Clark Corp. since 1937 and president of its Canadian associate, Spruce Falls Power & Paper Co. Ltd. since 1942, retired in January after 48 years of service. He will continue as a director of the company in which he started as a mail and messenger boy.

He is active in many Canadian and United States organizations connected with the paper industry. In addition to his office with K-C and Spruce Falls, he has been vice president of LongLac Pulp & Paper Co. Ltd. of Terrace Bay, Kimberly-Clark of Canada at Kapuskasing, and Upper Canada Lumber Co., LongLac, Ont.

W. R. Robinson has been named safety and personnel supervisor of the Woods Department at Dryden Paper Co. Ltd., Dryden, Ont.

W. R. Robinson

A. J. Hudak

Albert J. Hudak recently became superintendent at Western Containers Inc., Lockport, N. Y., a subsidiary of Ohio Boxboard Co. He came to the company early last year as general foreman from Ohio's Container Div.

Charles Cumby has been appointed plant manager of the Chicago corrugated box plant of Stone Container Corp.

Necrology . . .

Harry E. Fletcher

Harry E. Fletcher, chairman of the board of Fletcher Paper Co. in Alpena, Mich., died January 9. He was 71 years old.

A chemical engineering graduate of the University of Michigan, Mr. Fletcher began his career with the Alpena firm in 1907. In 1922, following the death of his father, he became vice president and general manager. He was named president of the firm in 1941.

During his long career he helped to organize and became the first president (1915-1916) of Tappi. He was Tappi medalist for 1942.

Harry Fletcher

Frank Payne

Frank Payne, chairman of the board and co-founder of Crane Packing Co., died recently after a long illness. He invented some of the most widely used packings in the marine field and general industry.

Gerald Haywood

Dr. Gerald Haywood, 59, technical assistant to the manager of technological research and development for West Virginia Pulp & Paper Co. and one of the nation's leading authorities on cellulose chemistry, died recently after a brief illness.

Active in the company's research and development program for over 40 years, Dr. Haywood held a number of important patents in the field of pulp and paper manufacture. His outstanding contributions were in the development of machine coating of paper and the use of pigments in paper fillers and coating formulations. Centre College awarded him an honorary Doctor of Science degree in 1952 in recognition of his work.

William Guy Martin, retired sales vice president for Harris-Seybold Co., died in California at the age of 68. He had served more than 40 years in the graphic arts industry at the time of his retirement in 1951.

Clarence K. Lloyd, died at 63. He retired 18 years ago as general manager of George W. Millar & Co. Inc., a New York paper converting firm.

Cormac J. McMahon, for 28 years a representative of Appleton Woolen Mills in the north central states, died at 70. He had retired last spring.

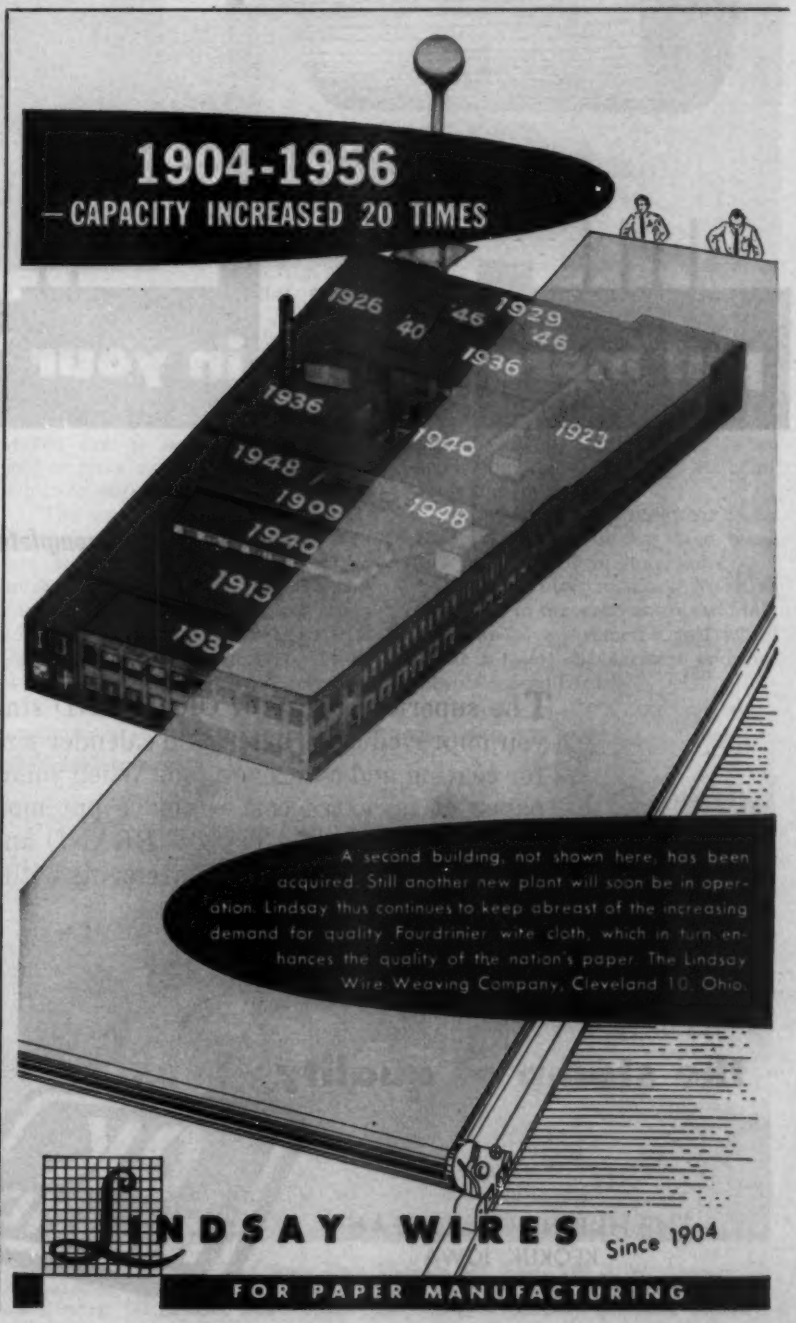
Dr. S. D. Douglas, senior scientist in the research department of the Carbide & Carbon Chemicals Co. Div. of Union Carbide & Carbon Corp., died in Houston, Texas, after a long illness.

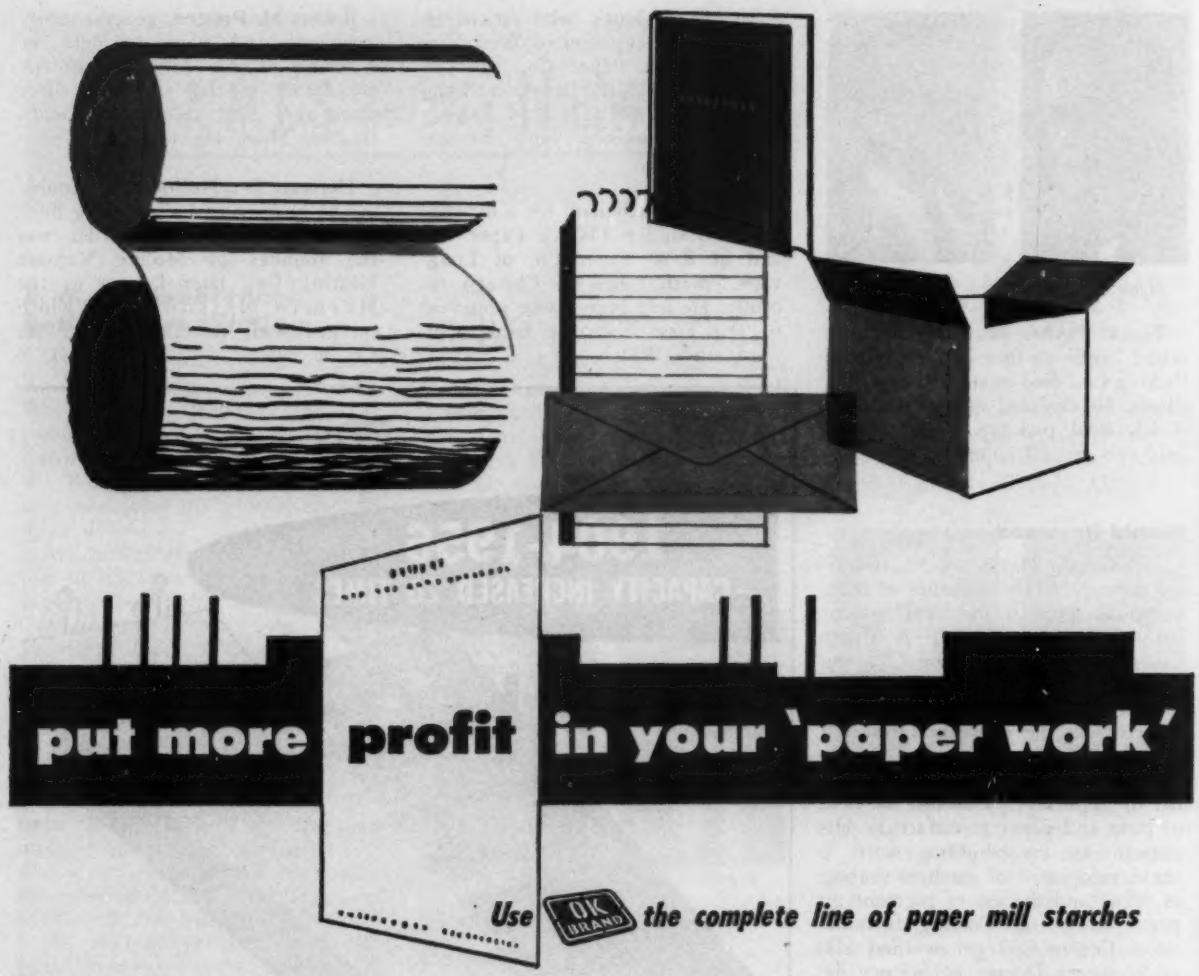
Samuel B. Jones, who retired in 1944 as chief engineer of West Virginia Pulp & Paper Co., died in December at 75. He had joined the company in 1923 as a field and development engineer and became chief in 1937.

James L. Buchanan, 63, a director of Rhinelander (Wis.) Paper Co. and of R-W Paper Co. of Longview, Wash., died in Chicago recently. He had been a vice president of the First National Bank, Chicago, since 1931.

Robert M. Preston, general superintendent and vice president of American Tissue Mills before the liquidation of that company three years ago, died recently in South Hadley, Mass. He was 73.

Herman W. Nelson, 79, pioneer in the heating and ventilating business, died in Moline, Ill. He was the founder of Moline Vacuum Heating Co., later known as the Herman Nelson Corp., which merged with American Air Filter Co. in 1950.





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SAFETY NEWS

SAVED: ONE FOOT—Badly bent toe guard is inspected by Romeo Duquette, wood handling supervisor, and John Walker, member of the Burgess safety committee. Had the toe guard not been worn, a falling log would have caused a serious accident

SPECIAL DEVICE prevents rewinder start-up until guard is in place. Plant Manager Carl von Ende and Jack Rodgerson, safety director, inspect the mechanism that was developed by the Cascade Mill's "Mr. Safety," Del Aube

Safety Has Top Priority at Brown Company Mills: Fair

MOST ACCIDENTS NEED never happen, declared A. E. Harold Fair in a recent issue of *The Brown Bulletin,* employee publication of Brown Co. at Berlin, N. H. Mr. Fair is president of the firm.

In an article written expressly for mill employees in an effort to increase safety practices in the plant, he said that, "When we think of accidents, we usually think of machines. But the fact is that by far the majority of accidents are caused by human errors—rather than by machinery."

Calling human carelessness the primary cause of mishaps, Mr. Fair cited one mill that cut its accident rate in half merely "because all departments and all employees made a real effort to cut down on accidents. Everyone became more alert to the necessary hazards in the mill—and they learned to avoid those hazards. Unnecessary hazards were found, and something was done about them."

For the Protection of Everyone

Describing the definite prerequisites of accident reduction, Mr. Fair declared: "First of all, everyone of us must decide he wants to work in a safer mill, not only because of himself but for the protection of everyone.

"Management must give serious and real leadership to a safety program. The aim in this should not be to save money but to save human suffering and to make our mills better places in which to work.

"The actual preventing of accidents can be accomplished only by the men and women in the mills. Thus, we must have safety training of new employees. And we must have incentives to create a consciousness of safety. Above all, it requires a group effort with everyone taking part. Safety suggestions from employees must be considered carefully and, if practical, acted upon promptly. These things are being done in many instances.

"Safety is not something that comes after everything else has been taken care of. It's first in importance.

"Our incentives to reduce accidents should be to prevent human suffering. Then we have a common goal which we as a team—management and employees—should reach."

THE SAFETY COMMITTEE of Brown Co.'s Riverside Mill meets with R. W. Andrews (r), vice president, to map plans for safer operations. In addition to Mr. Andrews, the members are (l to r): Leo Landers, superintendent; Earl White; Vic Gosselin, and Aime Charest

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Money earned
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by Testing Machines, Inc.

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Simply designed, exceptionally sensitive performance. Graduations 1/100,000". Constant load. Capacity 1/16", stainless steel anvils.

MODEL 549M
This improved version makes hand operation obsolete. Only motorization assures TAPPI dead weight load 7-9 lbs. psi. Graduated 1/10,000", range 0 — .040", stainless steel anvils.

MODEL 551M (not illustrated)
Similar to 549M but with graduations of 1/1000" and range of 0—.250".

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PATENT REVIEWS

MELVIN NORD*

Producing bleached sulfite pulp with high strength properties from hardwoods

U.S. 2,719,788, issued Oct. 4, 1955, to Erik K. M. Hagglund and assigned to Mo Och Domsjo Aktiebolag, describes a process for producing, from hardwood, bleached sulfite pulp in a high yield and with high strength properties.

The hardwood is digested with a calcium bisulfite cooking liquor at 110°C. for such a time that a pulp is obtained, which is disintegrated and subjected to a bleaching in two or more stages while using chlorine dioxide or chlorite as bleaching agent for the final bleaching for high brightness.

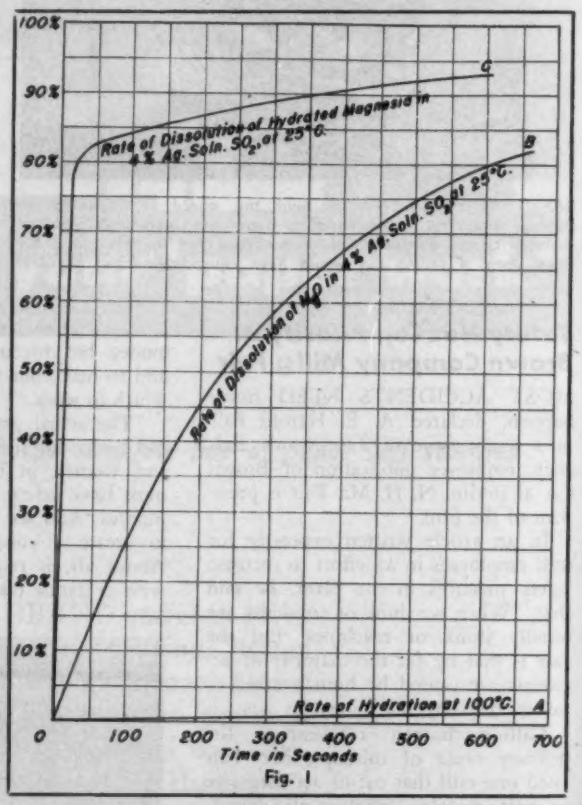

Fig. 1

Regenerating magnesium bisulfite solution

U.S. 2,716,589, issued Aug. 30, 1955, to Alva C. Byrns and assigned to Kaiser Aluminum & Chemical Corp., relates to the production of pulp by digestion with magnesium bisulfite instead of calcium bisulfite, and especially to the regeneration of the magnesium bisulfite digestion liquor.

Magnesium hydroxide is used as make-up for lost magnesia valves, and this is reacted with SO_2 gas to form magnesium bisulfite. The improvement over using unhydrated magnesia is shown in Fig. 1. Curve A represents the rate of hydration of a portion of hard-burned magnesia having an iodine number of less than 1.0. Curve B represents the rate of reaction of another portion of the same magnesia when reacted with SO_2. Curve C represents the rate of reaction of another portion of the same magnesia after it has been hydrated by boiling for 1 hr. in mixture with an excess of water.

*Patent attorney, 17600 Pinehurst, Detroit 21

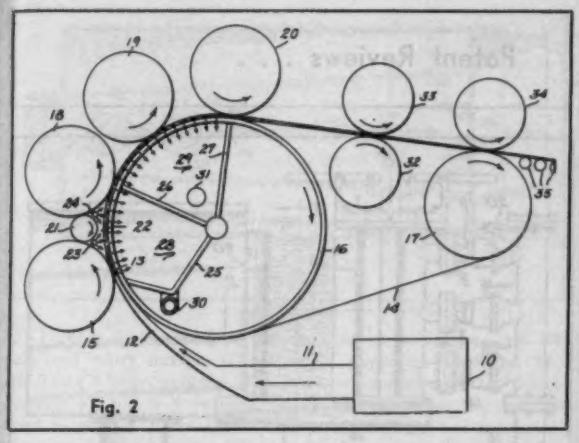

Fig. 2

Manufacture of fiberboards

U.S. 2,714,081, issued July 26, 1955, to William J. Burgon and assigned in part to William H. Rambo, discloses a method of manufacturing intermediate-or-low-density fiberboards (about 0.7 density), which may be used as such or may later be formed into hard fiberboard.

The method is shown in Fig. 2. The box 10 represents equipment for forming plastic lignocellulosic fibers (e.g. the Asplund equipment, described in U.S. 2,008,892, etc.). The fibers leave the box in an envelope of steam and are conducted through a short outlet pipe 11 into a thin, wide discharge spout 12, which ends between a traveling screen 14 and a driven heated roll 15. The screen is supported on a perforated cylinder 16 and a stretcher roll 17.

The mat while sustained on the drum is successively compressed and released by the application of pressure by heated rolls 18, 19, and 20. The mat is also subjected to suction from the interior of cylinder 16.

The space between rolls 15 and 18 is sealed from the atmosphere by an intermediate sealing roll 21. A pipe 23 supplies any foreign chemicals desired, such as coloring matter, resin, etc., and steam is admitted through pipe 24, to drive the chemical into more intimate contact with the fibers and distribute them more evenly through the mat.

The pressure of pressure rolls 32 and 33 further compacts the mat as it travels towards the stretcher roll 17, and further pressure is applied by roll 34. The sheet is then carried by carrier rolls 35 to any desired finishing equipment.

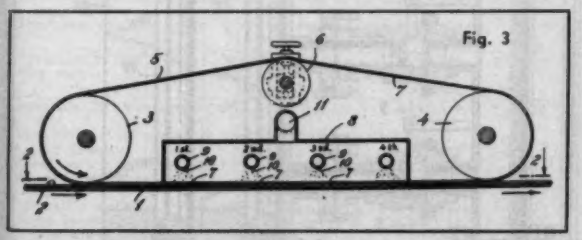

Fig. 3

Apparatus for watermarking paper

U.S. 2,711,120, issued June 21, 1955, to James D. Mac Laurin, describes a method and apparatus for producing a watermark in a paper web during its formation in the paper machine.

As shown in Fig. 3, the watermarking apparatus consists of two pulleys 3 and 4, over which a continuous belt 5 runs. The belt runs at the same speed as the screen and contains cut-outs of the desired variety, so that the belt is a sort of traveling stencil.

As the belt passes under the air box 8, it is blown against the screen. A number of air nozzles 9 containing perforations 10 facing downward supply the pressure which causes the stencil to make watermarks on the paper.

The patent also describes a modification in which color is added at the same time as air, thereby producing watermarks in color.

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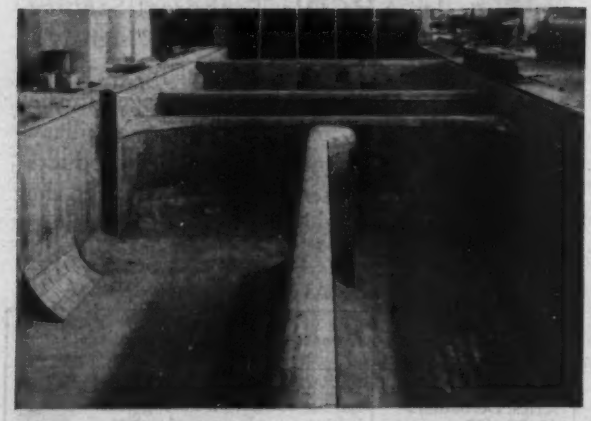

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Patent Reviews . . .

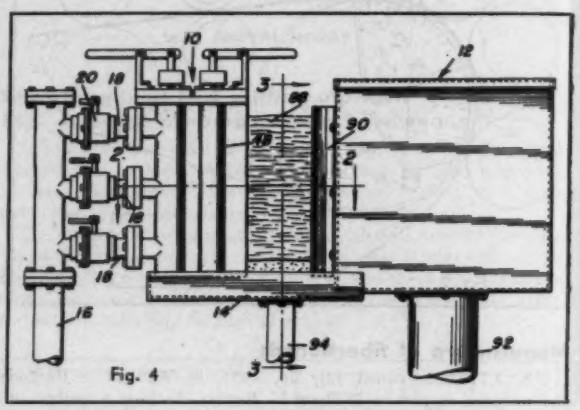

Fig. 4

Pulp cleaner

U.S. 2,715,860, issued Aug. 23, 1955, to Theodore M. Walters and assigned in part to Lewis C. Walter, describes a pulp cleaning mechanism.

As shown in Fig. 4 the assembly consists of an ejector assembly 10, a pulp receiver assembly 12 and a trough 14 for receiving the particles of foreign material. Reference numeral 16 indicates an inlet pipe by means of which the mixture of fiber, foreign material and water is fed into the ejector assembly by means of the short inlet lines 18, which incorporate the valve mechanisms 20.

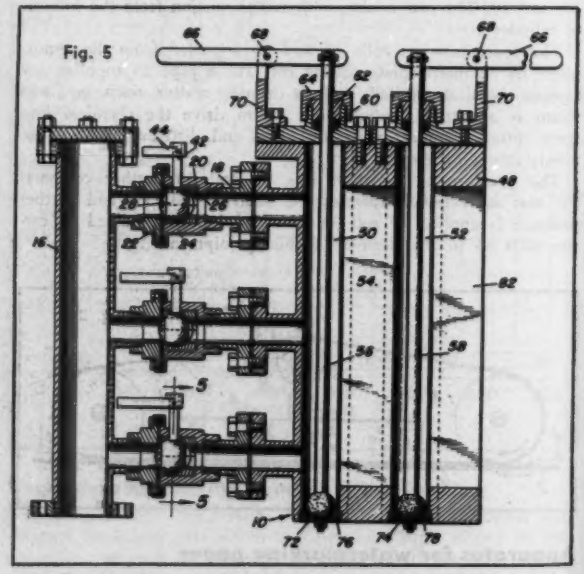

Fig. 5

As shown in Figs. 5 and 6, the ejector assembly consists of a vertical body 48 containing first and second cylindrical collection chambers 50 and 52 interconnected by a narrow passage 54. Each collector chamber is provided with a deflector rod 56, 58, which may be lifted by means of handles 66. The lower ends of the deflector rods carry resilient balls 72, 74 seating on the apertured plugs 76, 78. Normal pulp pressure will keep the valves 72 and 74 closed.

In operation, as seen in Fig. 6, the pulp fiber, water and foreign material mixture is introduced into the first chamber 50 and strikes the deflector rod 56 which will tend to move the heaviest particles, namely, the foreign material, to the surfaces of the chamber 50, where some will fall by gravity to the valve

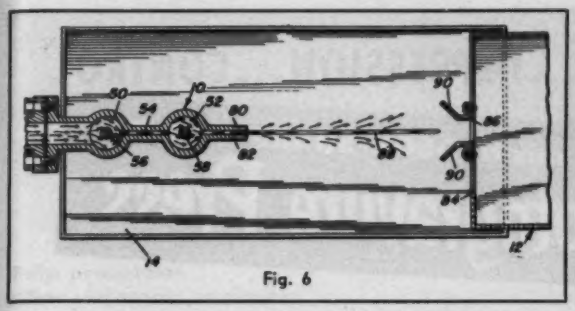

Fig. 6

72. Foreign material which continues in its movement with the pulp and water mixture will settle in the second chamber. The remaining foreign material will be issued out through the nozzle opening 82 and will be disposed on the outer side faces of the sheet 88 issuing from the nozzle. The retarding force of the atmosphere will therefore act most drastically on the heavy foreign material particles, causing them to drop off and separate themselves from the sheet 88 to fall into the trough 14 and permit clean pulp fiber and water mixture to enter the receiver 12 through the slot 86.

Periodically, the valve levers 66 may be manipulated to blow down any foreign material which will have collected in the chambers 50 and 52.

Bleaching a mixture of sulfite and semichemical pulps

U.S. 2,723,179, issued Nov. 8, 1955, to Lawrence W. Murtfeldt and assigned to Consolidated Water Power & Paper Co., describes a process for chemical refining and bleaching a mixture of a conventional sulfite pulp and a semichemical pulp.

The pulps, in fiberized condition, are first subjected to a treatment with a portion of the required amount of its predetermined bleach demand in the form of elemental chlorine to chlorinate the lignins of the pulp. This is followed by subjection to an alkaline solubilizing agent, and then by final bleaching with an oxidizing agent such as a hypochlorite. Washing follows each of the three steps.

Other Patents of Interest to the Pulp and Paper Industry

Subject	Inventor or Assignee	Patent No.	Date
Defoaming agent for pulp and paper stock	Nopco Chemical Co.	2,715,614	8/16/55
Fluorescent whitening agents	E. I. du Pont de Nemours & Co.	2,715,630&2	"
Production of fiber felts	Wood Conversion Co.	2,715,755	8/23/55
Pulp press	Canadian International Paper Co.	2,715,871	"
Apparatus for manufacturing bags	Bemis Bro. Bag Co.	2,716,372	8/30/55
Combination shipping and display Cartons	The American Rondo Corp.	2,716,485	"
Paper milk containers with cream separating attachment	Carl N. Bergstrom	2,716,518	"
Collapsible carton	Marathon Corp.	2,716,519	"
Fitted fibrous cellulosic structural board	Herbert F. Austin et al	2,716,617	"
Apparatus for treating wood pulp	Jackson & Church Co.	2,716,926	9/ 6/55
Fourdrinier	Sylvester C. Sullivan	2,716,927	"
Hinged cover cartons	National Folding Box Co. Inc.	2,717,074	"
Thermal container	Charles L. Parham Jr.	2,717,114	"
Carton	Alford Cartons	2,717,115-6	"
Method for treating a fibrous material	Jackson & Church Co.	2,717,195	"
Papermaking machinery	Walter W. Metcalf	2,717,539	9/13/55
Sealing ribs for the suction boxes of paper machines	Karl Planer	2,717,540	"
Carton forming apparatus	Waldorf Paper Products Co.	2,717,341	"
Partition for a container	Gaylord Container Corp.	2,717,713	"
Fully lined hinged lid automatic box	The Interstate Folding Box Co.	2,717,731	"
Apparatus for conversion of sodium sulfide to sodium sulfite	John E. Greenawalt	2,717,825	"
Stabilized tall oil rosin and dry sizes	American Cyanimid Co.	2,717,838	"

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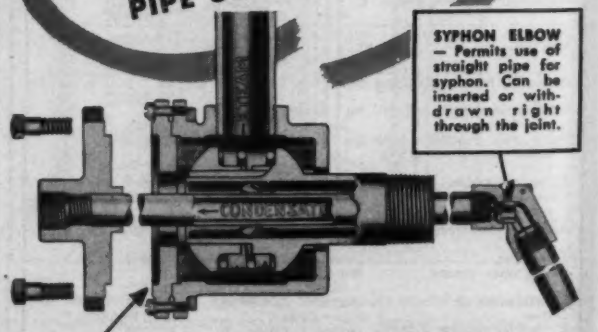
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FOREIGN ABSTRACTS

Pulp properties after ultrasonic treatment

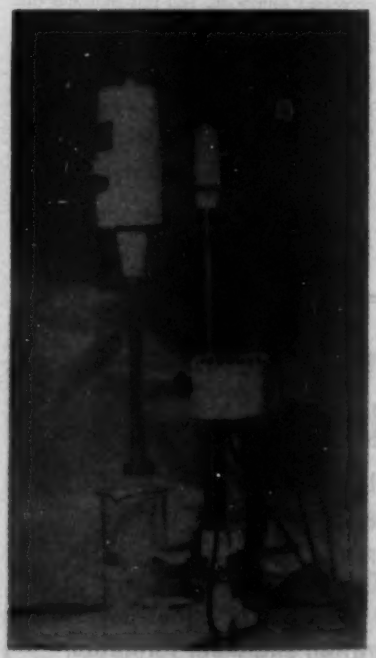
Pulps in aqueous suspension were subjected to ultrasonic treatment, which, it was found, caused significant changes in the fibers and especially in the cells of the summerwood. Beginning at the surface of the fiber, there was a general "loosening up" with fibrillation, and there was also an enlargement of the lumen. These changes were followed both with the microscope and the electron-microscope, aided by a new staining technique. The swelling values of the pulps increased markedly, the actual rise depending on the type of pulp and on its pretreatment. The present study confirms earlier ones on the differences between sulfite and kraft pulps. However the drainage properties of the pulps did not decerase after ultrasonic treatment.

By combining ultrasonic treatment with hydration in a Jokro mill, pulp strength properties increased, especially when the milling followed ultrasonic application. On the other hand, fibers which had been subjected to this treatment were extremely sensitive to cutting action in the mill, unless the rotor of the latter was lined with rubber, which thus permitted a crushing rather than a cutting action without extensive shortening of the fiber length. It was then that the strength properties of the pulps improved, the most significant gains being in internal tear and folding endurance.

It was essential not to subject the fibers to excessive ultrasonic treatment, which later caused decreases in fiber length and a loss in the strength properties. A new hypothesis on sheet strength properties is advanced. A full discussion is also given of the effects of the ultrasonic treatment on individual strength properties. Georg Jayme and Klaus Rosenfeld. *Das Papier* 9, 296-303; 423-429 (1955) (in German).

Effect of groundwood on the activity of phenylmercuric acetate

The biological activity of phenylmercuric acetate is greatly reduced (when tested with the organism *Pullularia pullulans*) in the presence of mechanical pulp. Thus, a concentration of the mercuric salt which completely inhibits the growth of the fungi *in vitro* is far less active when groundwood is present. By the addition of sodium or potassium chloride the activity of the phenylmercuric acetate is increased, even in the presence of groundwood fibers, but it is doubtful if this chloride effect has practical value, because the rise in biological activity is rather small. No marked difference in the biological activity of the mercury salt was observed when the time of action was increased from 20 hours to six days. The effect of sodium chloride was no more marked when 1000 parts per million were used than when the salt concentration was 100 ppm. No rise in biological activity was noted in the presence of alum or sodium sulfate; this result was independent of the presence of fibers. Stig K. L. Freyschuss. *Svensk Papperstidn.* 58,755-757 (1955). (In English).



New installations in the Central Cellulose Laboratory in Sweden

New installations of pulping and bleaching equipment in the Central Laboratory of the Swedish Cellulose Industry are described briefly with adequate illustrations. They include a new digester whose capacity is two cubic meters, and a battery of four forced circulation digesters, each with a capacity of 10 liters. Much work has also been done in redesigning existing equipment with a view to obtaining more reproducible and accurate results. Four large flow charts show the various layouts, and the sequence of operations including digestions, bleaching, pulp washing, screening and refining. The figure shows the new "Polytron" apparatus used in the defibration of small pulp samples. Swedish manufacturers gave significant help in securing new equipment. Sven-Erik Hagglund, *Svensk Papperstidn.* 58, 717-721 (1955) (In English).

Wrapping paper from Indian wattlewood

Laboratory and pilot plant experiments on the formation of kraft and soda pulps from wattlewood are described. Pulps were obtained in yields of 65-71 percent, the soda process giving the higher yields but the weaker pulps. Wattlewood sulfate pulps and soda pulps are both brown; the latter is the lighter of the two. Inasmuch as the pulp is short-fibered (averaging only 0.68 millimeters in length), it is necessary to mix in a suitable amount of longer fibered pulp, such as bamboo kraft, if wrapping papers are to be produced on commercial machines. The article includes actual samples of wrapping papers made at Dehra Dun., from 100 percent wattlewood pulp and from furnishes containing 70 per cent soda or kraft wattlewood and 30 per cent bamboo kraft pulps. R. V. Bhat and H. K. Kaushik, *Indian Forester* 81, No. 2,116-125 (1955), through the *Bull. Inst. Paper Chem.* 26.99 (1955).

Action of ultraviolet light on pulp sheets

A series of pulp sheets made from unbeaten, bleached sulfite pulps, and three samples of high grade filter paper were exposed (on the two sides) to ultraviolet light from a Hanau mercury vapor lamp. At intervals the sheets were examined for yellowing, for changes in physical properties, and for chemical changes. Even after six hours, the papers showed a loss in brightness (by the P.F.I. method). After 96 hours, this yellowing was very marked; the sheets all lost weight, and the tensile strength decreased both in the machine and the cross machine directions. The alpha cellulose and degree of polymerization also showed marked losses.

To assure himself that this very serious degradation was not due to excessive heat from the lamp, non-irradiated samples were heated at 105°C. up to eight days. After four hours there was no loss in weight (other than the normal loss of water), and no yellowing occurred even after protracted heating. On the other hand the irradiated samples besides losses outlined above, all lost in tear resistance, and could be less readily nitrated than prior to illumination. Nitration alsó involved losses in yield (especially after the 96-hour irradiation). Eighteen references

are given. F. A. Abadie-Maumert *Norsk Skogind.* 9,273-278 (1955) and *Papetierie* 77,593,595,597 and 599 (1955) (both reports are in French).

End-brooming: its effect on shives in groundwood

The broomed ends of spruce logs were coated with "Uvitex P. conc.," a chemical that is colorless in daylight but fluoresces very strongly when exposed to ultraviolet light. Groundwood (from spruce logs) pretreated in this way was screened, and the shive content determined. When these shives were exposed to ultraviolet light, those due to brooming could be determined quantitatively, and it was found that for 2-ft. spruce logs nearly 40 per cent of shives originated from broomed material. J.Brandal. *Norsk Skogind.* 9,433-436 (1955) (Original in Norwegian with a brief English summary).

Chip quality and properties of dissolving pulps

The study entailed the use of various types of chips and their effects on the production of dissolving pulps made by the calcium bisulfite process. The chips used included unscreened mill-made material, chips cut by hand (from the same log), screened mill-made chips, matchstick-size chips separated from unscreened chips, the coarse fraction of fines, and the fine fraction of fines. Throughout the study, the same wood was used. The effects on pulp yield and quality were thus studied under comparable cooking and bleaching conditions.

Attention was given mainly to the degree of cooking, viscosity, alpha cellulose content, extractives, chain length distribution in the pulps, and the distribution of fiber lengths. The matchstick chips yielded pulps equal in quality to that of normal pulps, although when cooked to lower viscosities the pulp yields (from the matchsticks) were somewhat lower. Any crushed chip material (obtained in the mill screening operation) gave pulps that were in every way inferior to those of normal pulps. The coarser fraction of sawdust (in mill rejects) contains an appreciable amount of raw material that is satisfactory for the production of dissolving pulps. Handmade chips yielded pulps that were low in fines, indicating that the presence of such fines in commercial pulps is due mainly to the crushing action during mill chipping.

As pulps were prepared with decreasing viscosities, the fine content of the pulp also decreased somewhat, and this indicates that the reduction in pulp yield, when the cooking is carried out to these lower viscosities, takes place principally at the expense of the fines. Chain length distribution studies indicate that there are no essential differences in the polymolecularities of the various pulps, providing the viscosity values of the pulps are maintained at the same level.

This is evidently a cooperative study made at the Finnish Pulp and Paper Research Institute and sponsored by two industrial mills in Finland. The experiments were actually carried out in 1948-1949 and seem now to be published for the first time. Twenty-six references, 11 graphs and 5 tables are given. Hannes Sihtola, Arvi Saarinen, Gunnar Wigren, Tapio Ulmanen, and Erik Saxen. *Paper and Timber* (Finland) 37,511-519 (1955) (In English).

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Foreign Abstracts . . .

Norwegian production of ethyl alcohol from spent liquor

A description is given, with suitable illustrations, of the new industrial plant of the Saugbruksforenigen, at Halden, Norway. The plant evaporates spent sulfite liquor, and produces ethanol, and is extremely modern in its thermotechnical applications. The residual heat of the ethyl alcohol plant is well utilized in the evaporating plant, the equipment being provided by the Swedish "Chematur" firm. Operating at full capacity, the alcohol plant can produce about five million liters of 96 per cent ethyl alcohol (free from methanol) per year. The product can be used in the chemical industry as well as for purposes of human consumption. The layout is shown in the figure. Erkki Aaltio. *Paper and Timber (Finland)* 37,471-4 (1955). (in Finnish, with brief English summary.)

Diffusion of sodium chloride through untreated and treated hardboards

The authors present two articles on diffusion of sodium chloride. In the first, diffusion under a maximum concentration gradient, at room temperature through certain varieties of fiberboard, plywood and solid wood was studied. Diffusion constants were calculated from Fick's diffusion equation. The diffusion through the hardboard was found to be dependent on the quality and on the sizing agent employed. Thus "Holzrit" sizing (blood albumin and sulfite spent liquor) did not affect the diffusion, whereas paraffin-sized boards showed considerable decrease in diffusion over that of untreated boards. Solid pine-

wood and birch (in the tangential direction) and pine plywood specimens showed very slight diffusion when compared with fiberboard. On the other hand, beech plywood permitted diffusion almost equal to that of a good grade of fiberboard.

In the second paper the diffusion through surface-coated boards was studied. Coating materials included phenol- and urea-formaldehyde resins, hydro-carbon waxes, asphalt, polyethylene, polystyrene and polyvinyl acetate (PVA). It was shown that while the waxes and polyethylene offered very good resistance to the passage of ions at the start, this resistance deteriorated with time. PVA water emulsions and phenol formaldehyde resins (used as coatings on either side of the boards) gave an overall high resistance to ionic diffusion. Asphalt showed rather poor resistance to diffusion. Twelve references, seven figures and three tables are included. O. L. Johansen and V. B. Kumar. *Norsk Skogind.* 9,282-288 (1955) (in English).

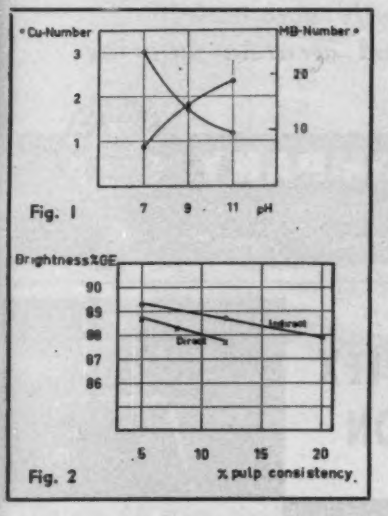

Fig. 1

Fig. 2

Hypochlorite bleaching

A comprehensive study was made of the influence of pH, temperature and pulp consistency during hypochlorite bleaching on the resulting properties of the bleached pulp. In every respect, the pulp quality improved by increasing the pH (up to pH 11). All properties were interpolated to a consumption of 1.0 per cent active chlorine and 0.2 per cent residual chlorine. Brightness, viscosity, alpha-cellulose content, and the percentage carboxy (judged by the methylene blue number) increased as the pH was raised from 7 to 11. Simultaneously, the beta-cellulose, copper number and yellowing tendencies decreased. Although the rate of reaction was doubled by an increase of every 7°C., the effects of temperature, up to 60°C., on the actual pulp properties were negligible.

The only effect of pulp consistency appears to be on the brightness, which decreased when the bleaching was carried out at high consistency. This was the case also if the fibers and the chemicals were carefully blended. The authors give their data in six tables and 13 graphs, of which only two are given here. Twenty-three literature references are included. Fig. 1 shows copper number and methylene blue numbers of bleached pulp as functions of the pH. Fig. 2 shows the relationship between brightness and pulp consistency. Karl-Erik Lekander and Lennart Stockman. *Svensk Papperstidn.* 58,775-785 (1955) (Original in Swedish with brief English summary; all tables and graphs are in English).

Flame photometric determination of alkali in lime sludge

A model 2, Lange Flame Photometer was used in which there was an atomizer, a gas burner, an optical system, an interference filter, a photocell, and a sensitive galvanometer as measuring instrument. The solution to be tested is atomized by compressed air and led to the gas flame. The light of the desired wave-length is isolated by use of the interference filter, and the intensity of the spectral line is measured by means of the photocell and galvanometer; this intensity is a function of the concentration of the substance to be determined.

In point of time, the flame-photometric method proved greatly superior to the corresponding titrimetric and gravimetric methods, and the accuracy of the photometric procedure was fully comparable to that of the best gravimetric methods. The present paper gives results of the total and soluble alkali of various lime sludges obtained from Finnish kraft mills. Some results of comparative analyses are given in the accompanying table.

Total alkali content of dried lime sludge

Lime sludge	Percentage Na_2O by flame photometry	Percentage Na_2O determined gravimetrically
1	1.81	1.74
2	4.50	4.56
3	1.86	1.83
4	2.93	2.90
5	1.49	1.48
6	0.80	0.79

Harald Totterman, Monica Johanson, and Siiri Salo. *Paper and Timber* (Finland), 37, 445-450 (1955) (In English).

Relationship between opacity and ash content of cigaret papers

From a study of the opacity and the ash content of 32 different samples of cigaret papers (basis weight 22 to 23 grams per square meter; thickness 30-31 microns), an approximately linear relationship was established between the percentage ash and the opacity as measured in a WeKa Photocell colorimeter. Thus, by simply measuring the opacity, it was possible to read the ash content directly from a calibration curve. The method is extremely rapid and the errors are usually small. The technique and calculations are described briefly but adequately. Reinhold Wieske. *Wochbl. Papierfabr.* 83,855-856 (1955) (In German).

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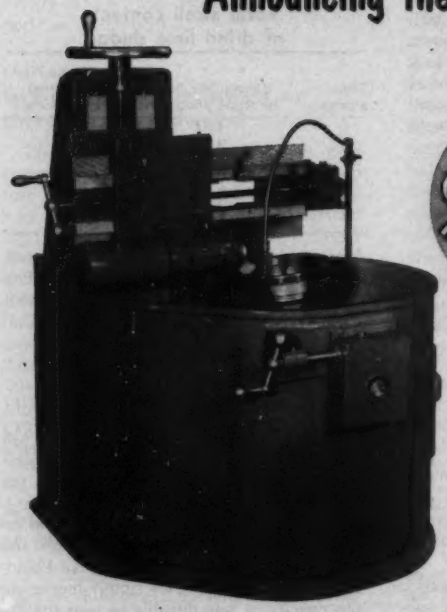

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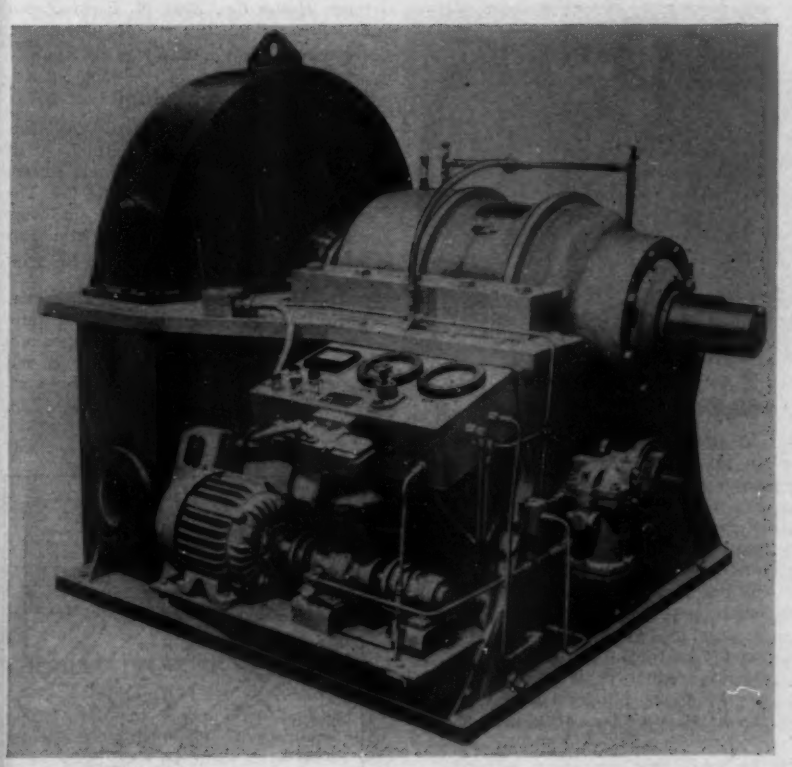

Balancer flow refiner

The new disk design, already tested in mill trials, is said to nearly double the capacity of the older disk on this new balanced flow refiner (pat. pending).

The balanced flow principle is entirely independent of gravity or pressure, allowing the flow of pulp to be regulated between refining elements. This controlled flow results in high pulp quality with greater reproduceability of results.

A new hydraulic system provides the exact force needed to offset the thrust loads of the pulp flow. Minor changes in pulp supply are automatically allowed for so that a constant refining action is maintained until the operator readjusts the controls.

The single rotating disk operating against a single stationary disk eliminates the problem of pressure differentials and uneven wear common to multi-disk refiners. Thus high replacement rate, high maintenance costs, and long periods of shut-down time are avoided. Cost of installation is low. *Sutherland Refiner Corp., Trenton, N.J.*

Speed-reducer for conveyor drives

A new combination helical and worm gear speed-reducer drive, which the manufacturer claims will afford unusual versatility for selecting input and output shaft locations, has recently been developed for use in overhead, trolley, floor and pit-type conveyors, and for similar industrial applications. The new reducer is mounted so that the output shaft is horizontal or vertical (either up or down) to suit mounting conditions, with input shaft at the horizontal right angle. It appears that this characteristic permits integration of the gear reducer into virtually any drive application. The new units are available in a wide range of output speeds; ratios utilizing 50:1 standard worm gear and helical reductions run up to 1800:1, additional worm ratios also being available.

The manufacturer states that the new units are compact and precision-engineered for rugged service needed in conveyor drives, and that changes in output speed can be made quickly and easily by changing the helical gears within the unit. Gear and drive components are accessible for inspection and replacement.

The new units, available with mechanical-electrical shutoff devices for torque or overload protection, are completely enclosed for dust- and dirt-proof operation. It is further pointed out that "dry well" construction prevents oil leakage around the output shaft, even in the vertical down-shaft position, and that all gears, shafts, bearings and housings are carefully machined and assembled. *Philadelphia Gear Works, "G" St. below Erie Ave., Philadelphia 34, Pa.*

Inorganic coating for steel structures

Introduced to give plant maintenance painters a material for protecting existing steel structures is a new coating called Dimetcote. Effects are claimed for the new material similar to that afforded by galvanizing, plus salt water resistance. Dimetcote is a 100 per cent inorganic, metallic zinc coating containing no oils or resins. The

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Vapo Systems

132 W. Home Ave., Villa Park, Ill.

manufacturer states that the coating, while not a paint, can be applied with either spray or brush and requires only one coat for most applications.

Claims are made that the new coating is unusually resistant to severe weathering and abrasion, but that it is not affected by solvents and petroleum products, and that it possesses the feature of cathodically inhibiting corrosion of contiguous areas of bare steel. According to the manufacturer, when Dimetcote is applied, a reaction takes place at the surface which produces chemical bonding as well as physical adhesion, so that it becomes almost impossible to find the interface.

Dimetcote has been used in a variety of industrial installations, such as structural steel, floating roof tanks, barges, marine drilling towers, ship decks and dam gates. *Amercoat Corp., 4809 Firestone Blvd., South Gate, Calif.*

Slitter and rewinder

A new slitter and rewinder is designed to convert various paper stocks to rolls up to 60 in. in width, 40 in. in diameter and 1500 lb. in weight at a wide range of speeds. For papers which require special handling, chrome-plated rolls are available. Single or double shaft wind-up may be selected.

The controls for starting, stopping tension adjustment, acceleration, and infinite speed variation are arranged within easy reach of the operator. Shear type or contact cutters can be furnished for handling a wide material range. Other special features include automatic web guide, static eliminator and blower type trim remover with receptacle.

A factory test run of any converter's material can be made without obligation. *Hobbs Mfg. Co., Salisbury St., Worcester, Mass.*

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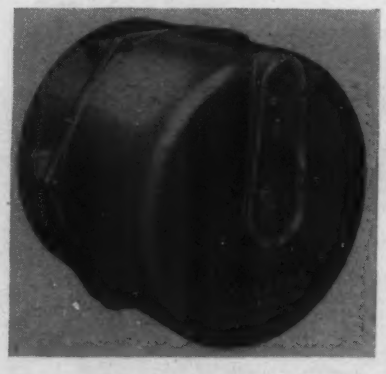


Magnetic brake

A new magnetic brake for use in the 50- to 100-hp range is announced, with design improvements which, it is stated, have reduced brake dimensions with no decrease in torque rating. The manufacturer states that 5¾ in. less clearance is required for housing removal; the diameter has been reduced 2 in., and the brake length has also been shortened. Four torque ratings are available: 230, 345, 460 and 575 lb. ft. The new brake may be supplied for motor or floor mountings and may be arranged to operate on ac or dc. *Stearns Magnetic Inc., Milwaukee 46, Wis.*

Lift truck

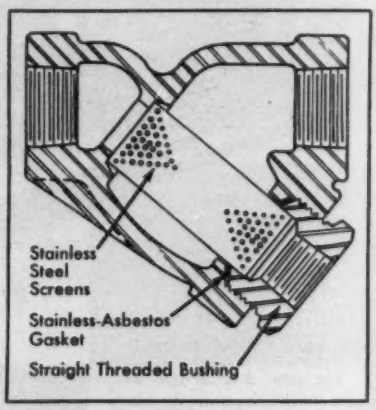
A new lift truck, described as a compact, highly maneuverable 5000-lb. unit, is now available. The truck's outside turning radius of 79 in. is said to create unexcelled maneuverability in narrow warehouse aisles, while its short length, narrow width and ease of steering will, it appears, contribute to faster on-the-job output. The manufacturer points out that a net weight of 7110 lb. permits truck operation on lighter weight floors, and that a low center of gravity and comparatively long wheelbase are design qualities which improve traction, weight distribution and operating ease. The new units are powered by Waukesha gasoline engines, with diesel engine, LP gas conversion kit, "Hystamatic" drive and free lift as optional features. *Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore. or 1003 Myers St., Danville, Ill.*

New Products . . . . . .

Low-dosage coagulant

A new low-cost, low-dosage coagulant and coagulant-aid, a polyelectrolyte, will aid in coagulating turbid river and surface waters for industrial and cooling use. The product will effect coagulation in many cases where presently available treatments are ineffective and where iron and alumina floc carry-over is a problem.

This clear, liquid alkaline, which is noncorrosive to steel, is recommended for waste water treatment as well as for paper mill treatment of water for general service and for settling in savealls. *National Aluminate Corp., 6216 W. 66th Pl., Chicago 38, Ill.*



Pipe strainers

Six sizes of carbon moly steel strainers for oil, gas, air, water and steam lines are suitable for pressures up to 900 lb. and temperatures to 900°F. Maximum pressure at 100°F. is 1800 psig. The Y-type strainers are available in ½-in. through 2-in. sizes. Stainless steel screens are standard: either .045-in. diameter holes, 226 per sq. in., or 24 x 110 wire mesh. Other screening material is available to meet most requirements. A stainless-asbestos gasket is locked in between the body and the base of the bushing to eliminate any chance of blowout. *Armstrong Machine Works, Three Rivers, Mich.*

Dehumidifier

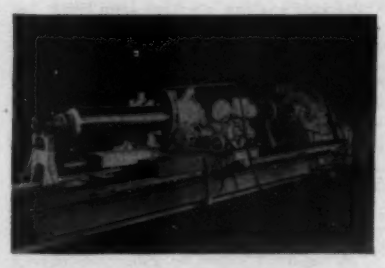
Development of a new adsorption type, heavy-duty dehumidifier suitable for use in factories, warehouses, storage vaults and other large areas where controlled humidity is desired, was recently announced.

The Dryomatic T-150 is an automatically-regulated dual-tower unit, using silica

gel as the drying agent. Designed to maintain humidities as low as 10 per cent in areas up to 60,000 cu. ft. over a wide range of temperatures, this machine has a dry air output of 150 cfm, it is claimed, and is capable of removing 4 to 5 lbs. of water per hr. The regeneration of the silica gel is accomplished automatically by electric heating elements.

A newly designed motor-operated four-way valve alternately directs the air from one silica gel tower to another, and as one tower is regenerated, the other continues to dehumidify, thus providing constant flow of dry air. Another feature of this machine is the use of thermostats for control of the regeneration cycle, thus making the machine self-adjusting to atmospheric conditions.

Built-in or remote humidistat control can be provided for completely automatic on-off operation and, being compact, this unit can be mounted on casters for easy relocation. The unit requires only standard electrical outlets and a minimum of duct work. *Dryomatic Corp., Alexandria, Va.*



Grinder for small mills

This new grinder for small mills offers the maximum of simplicity in design for error-free operation. It is capable of grinding rolls from 6 in. to 32 or 36 in. and with face length according to bed length. Some of its outstanding features are: newly designed crowning device to give full range of desired crown curves, choice of ac or dc current, grinding wheel mounted on end of wheel spindle for quick wheel change, coarse and fine feed at wheel, automatic wheel infeed to compensate for wheel wear on chilled iron, self-contained wheel spindle—forced feed lubrication with oil pressure control, metallic telescoping way-covers which give full protection and inverted Vee-ways which are stronger and better lubricated. *Lobdell Div., United Engineering & Foundry Co., Wilmington 99, Del.*

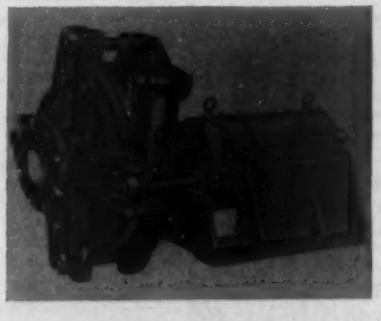
Base knife and face grinder

A new series 220 of traveling table design for face and bevel grinding of chipper, paper veneer and other straight knives has table speeds variable from 10 to 100 fpm. The hydraulic system includes one cylinder, hydraulic pump, control valves, gauges and all necessary piping, and is driven with a 5-hp motor.

The segmental grinding head is mounted directly on the motor spindle, and is adjustable for flat or concave bevel grinding. The wheel head can be automatically or manually fed.

All heavy castings are normalized and the machine is equipped with a motor-driven cooling system. Standard equipment is a fully machined, plunger type wheel dresser mounted on a heavy-duty wheel guard.

Optional is a magnetic chuck, mechanical knife bar or swivelling work table. Although standard sizes run from 78 to 220 in., longer sizes can be made to order. *Samuel C. Rogers & Co. Inc., 2070 Sheridan Drive, Buffalo 23, N. Y.*



Heavy-duty pump

This heavy-duty and suction pump is designed to handle abrasive slurries of cement, sand, coal, solids, chemical sludges and other products up to the maximum fluid consistency under suction lift or positive head. It is all metal and available in seven different models, from 2- to 6-in. sizes.

Removing only four bolts allows the pump to be opened for most maintenance requirements without disturbing the piping. Interchangeable liners on both sides of the impeller puts the wear on easily replaceable parts, and the rotating element is adjustable to take up for any wear.

External vanes on both sides of the impeller prevent packing between the impeller and casing. The impeller is pressure balanced to prevent recirculation and is threaded to the shaft and sealed against corrosive action. *Morris Machine Works, Baldwinsville, N.Y.*

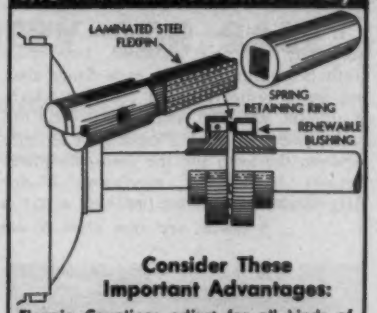
Chain couplings

Newest addition to a line of Taper-lock sprockets and roller chains is a type of chain coupling which is flexible, permitting sufficient relative movement between the hubs to accommodate slight angular and parallel shaft misalignment. This coupling provides a strong and positive, yet compact, direct coupling of the shafts, it is claimed.

Features of the new couplings include Taper-lock bushings, available in the desired sizes, with no boring required. The manufacturer states that these make easy installation upon full-size or normally undersized shafts, yet give the equivalent of a shrunk-on fit.

The chain is a double-width, standard precision chain conforming to American Standard Association specifications, said to be definitely superior to designs employing single-roller or narrow-width chains. Additional bearing area permits higher

STOP BEARING FAILURES
...shaft misalignments
the FLEXPIN COUPLING Way



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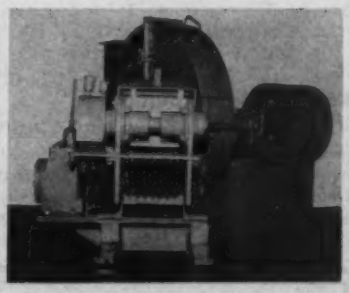

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horsepower ratings and longer wear life. Quick disconnecting of the shafts can be achieved by removing the one coupling pin and unwrapping the chain from the hubs.

It is pointed out that sprocket teeth are accurately cut and hardened, two more teeth being furnished in each flange than are found ordinarily in a coupling which, it appears, will also contribute to long life and power-transmitting capacity. Clearance between the teeth and the chain side-plates permits freedom of movement. *Dodge Mfg. Corp., Mishawaka, Ind.*

Trackmobile

Outstanding feature of the new Trackmobile just introduced is that the machine can be driven as a freight car mover around the yard, across unimproved track or on the road as easily, it is claimed, as a light truck. This is effected by retraction of road wheels, the Trackmobile then moving sidewise on rail wheels when moving freight cars.

The manufacturer states that the Trackmobile does the work of a switch engine, moving as many as six fully loaded freight cars at one time, with a possible weight-moving potential up to 1,000,000 lb., although the machine itself weighs only 9,000 lb. *Whiting Corp., 157th & Lathrop Ave., Harvey, Ill.*

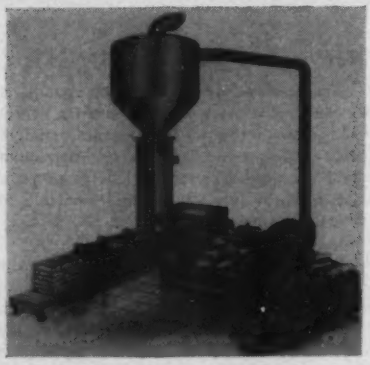
Portable hand pump

Provided as a time-saving device is a new portable hand pump for refilling all types of oil cups and reservoirs directly from a 1-gal. or larger container through a light, flexible hose. The manufacturer

New Products . . . . . .

states this is also handy for dispensing oil to bearings, cutting tools, conveyor and drive chains, gears, pipe-threading operations, spindle bearings on textile machinery and similar operations.

The new product, called "Redi-pump," does away with the need for transferring oil from one container to another, because the suction hose can be tapped directly to the container in which oil is purchased, this also eliminating frequent stoppages to refill small oil cans. The manufacturer points out that Redi-pump dispenses oil in any direction or angle, making it ideal for hard-to-get-at locations, and that no air lines are needed. The nozzle is made of an alloy steel sturdy enough, it is claimed, to withstand possible damage through hard use. *Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.*



Power baling system

Industries with large quantities of scrap paper and corrugated boxes and sheets to be disposed of can now bale as much as 4 tons of scrap paper an hour in bales up to 1000 lb. each. Completed bales measure 26 x 32 in. and any desired length up to 72 in.

One man operates this entire baling system, which can handle all types of paper. The baler permits complete segregation of various types of papers automatically and without stopping the operation. Costly preparation of scrap is eliminated by several mechanical innovations. Paper is fed onto a feed table and forced through pinch rollers into a hogger for chopping into small pieces. It then passes under pressure through an airveyor and into a "cyclone" where the air is exhausted and the pieces of paper drop into the hydraulic baler. Photo-electric eye switches control uniformity of the bale.

The baler can be mounted in a 23- x 23-ft. area and needs no pit. Dust and dirt are eliminated because the paper is completely under cover from pinch roll to baling.

The company offers a free demonstration baling to prospective customers who may send up to a ton of scrap paper and watch it being baled. *Balemaster Div., East Chicago Machine Tool Corp., East Chicago, Ind.*

Chipper disc face

New and existing Murco chippers may now be provided with a new disc face that produces a more uniform chip with less bruising, less rejects and less sawdust. The knife covers and disc plates below the wear plates are specially machined to an inclined contour giving increased support to the wood with resultant improvement in the quality of chips. *D. J. Murray Mfg. Co., Wausau, Wis.*

Armor for glass pipe

A seamless sleeve of Fiberglas, impregnated with polyester, fits snugly over glass pipe and forms an armor designed to protect the pipe against rough handling and to carry the same work load as the pipe in case of glass failure. The jacket is non-flammable, corrosion resistant and unaffected by weather, moisture or rodents. It has a maximum operating temperature of 300°F.

Since the sleeve runs to the very end of each section of pipe, drippage will be held to a minimum in case of glass failure. The sleeve will carry the rated load of the glass pipe indefinitely. As it is only 1/16 in. thick, it allows sufficient visability to determine liquid levels in the pipe. *Corning Glass Works, Corning, N. Y.*

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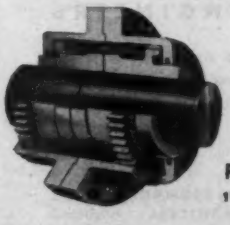

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The hemicelluloses

(Continued from page 1026)

Effects of acid groups on beating

Saarnio (29) recently studied the effect of total acid groups and of the uronic acid carboxyl content of bleached and unbleached pulps on their rate of beating. The total free carboxyls and/or the uronic acid carboxyls influence the water absorption in sulfite pulps. The higher the uronic (or total) carboxyl content, the more easily is the pulp beaten, the greater the water absorption, and the slower the drainage time. Actually, the percentage of these free carboxyls is very low, but their influence may be extensive. Alkali treatment decreases the carboxyl content of a pulp and also the rate of beating. Thus, very small changes in this carboxyl content may strongly influence the papermaking properties of the sulfite pulp.

Unbleached kraft coniferous pulps contain practically no carboxyl (6), but kraft pulps from angiosperms are often fairly high in such groups (ranging from 0.15 to about 0.5 per cent). This may account in part for the faster beating properties of hardwood kraft pulps.

Hemicelluloses not always beneficent

The hemicelluloses are not always beneficent pulp components. Even in relatively small amounts they prove a nuisance in the dissolving pulps. Thus, xylose or mannose units (2) in cellulose acetate made from a coniferous pulp leads to "haze" in the acetate solutions, which in turn may function in clogging the filter presses. Englemann (30) isolated haze from cellulose acetat solutions and found that the most insoluble acetate fractions contained appreciable amounts of uronic acid units, pentosans, and (Ca) ash. Keith Bradway (2) at the Institute has also isolated and studied a "haze" for an "unsatisfactory" cellulose acetate. All haze fractions (which are dominantly cellulose acetate) retained mannose and xylose units. Complete removal of this haze also resulted in an acetate free of mannose and xylose units.

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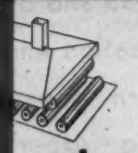

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MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are quotations to mills, f.o.b. New York: per cwt.

No. 1 White Shirt Cuttings	14.50 to 15.50
New Unbleached Muslins. .	16.25 to 16.75
Fancy Shirt Cuttings ...	5.50 to 6.00
No. 1 Percales	6.50 to 7.00
No. 1 Washables	2.75 to 3.00
No. 1 Light Silesias	7.50 to 8.00
No. 1 Light Prints	5.50 to 6.00
Light Flannelettes	7.50 to 8.00
Cottonades	3.75 to 4.00
Blue Overalls.....	8.00 to 8.50
Blue Cheviots	8.00 to 8.50
Canton Flannels, Bleached	11.50 to 12.00
Canton Flannels, Unbleached	11.50 to 12.00
Osnaburg Cuttings	10.50 to 11.00
Underwear Cuttings, Bleached	16.00 to 16.50
Underwear Cuttings, Unbleached	16.00 to 16.50
Khaki Cuttings—	
Sun Tan	6.25 to 6.75
Mixed	3.75 to 4.00
Linen Cuttings—	
American	7.50 to 8.00
White	12.00 to 13.00
Grey	12.00 to 13.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

Roofing	Per cwt.
No. 1	1.45 to 1.55
No. 2	1.35 to 1.45
No. 3 and 4	1.05 to 1.15
Twos and Blues— Repacked	2.50 to 2.75
Thirds and Blues— Repacked	2.25 to 2.50
Miscellaneous	2.00 to 2.15
Whites, No. 1— Repacked	4.00 to 4.25
Miscellaneous	3.25 to 3.50
White, No. 2— Repacked	3.00 to 3.25
Miscellaneous	2.50 to 2.75

RAGS (Foreign)

ex dock New York City

NEW RAGS

per cwt.

Nominal:
- New Dark Cuttings.....
- New Mixed Cuttings.....
- New Light Silesias.....
- Light Flannelettes.....
- Unbleached Cuttings.....
- New White Cuttings.....
- New Light Oxfords.....
- New Light Prints.....

RAGS (Foreign)

ex dock New York City

OLD RAGS

per cwt.

Nominal:
- No. 1 White Linens.....
- No. 2 White Linens.....
- No. 3 White Linens.....
- No. 4 White Linens.....
- No. 1 White Cottons.....
- No. 2 White Cottons.....
- No. 3 White Cottons.....
- No. 4 White Cottons.....
- Extra Light Prints.....
- Ord. Light Prints.....
- Med. Light Prints.....
- Dutch Blue Cottons.....
- French Blue Cottons.....
- French Blue Linens.....
- Checks and Blues.....
- Linsey Garments.....
- Dark Cottons .....
- Old Shopperies .....

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	5.50 to 6.00
Domestic	5.50 to 6.00
Wool Tares—	
Light	5.50 to 6.00
Heavy	5.75 to 6.25
No. 1 Scrap Bagging .	4.75 to 5.25
Manila Rope—	
No. 1 large, dom.	7.50 to 8.00
No. 1 small	6.50 to 7.00
Sisal Rope—	
No. 1 large	6.00 to 6.50
No. 1 small	5.50 to 6.00
New Burlap Cuttings....	5.75 to 6.25
Jute Threads—	
Foreign (Nom.).....	6.00 to 6.25
Domestic	6.25 to 6.50
Strings—	
No. 1 sisal.....	4.75 to 5.00
No. 2 sisal.....	4.25 to 4.50
Soft jute.....	4.75 to 5.00
Mixed	2.00 to 2.25

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts.	145.00 to 155.00
Hard White No. 1 ..	110.00 to 115.00
Soft White, one-cut ..	95.00 to 100.00
Soft White, No. 1 ..	80.00 to 85.00
Fly Leaf No. 1	45.00 to 50.00
Fly Leaf, Woody No. 1	45.00 to 50.00
No. 2 Mixed Col. Woody	35.00 to 40.00
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked .	32.00 to 34.00
Mixed Books	25.00 to 27.00
Ledger Stock—	
No. 1 White	65.00 to 70.00
No. 1 Mixed (Colored)	42.50 to 47.50
Manilas—	
New Env. Cuttings ..	80.00 to 85.00
New Cuts, One-Cut—	
Extra Manilas	23.00 to 25.00
Manilla Tab Cards, Free of Ground Wood	95.00 to 100.00
Colored Tab Cards	75.00 to 80.00
Kraft—	
New Envelope Cuttings	85.00 to 90.00
Tripled Sorted No. 1 100%	45.00 to 50.00
No. 1 Old Assorted ..	32.50 to 37.50
News—	
White Blank	85.00 to 90.00
Overissue	32.00—
No. 1 Folded	26.00—
Old Corrugated Containers	24.00—
New Jute Corrugated Cuts	29.00—
Mill Wrappers	24.00—
Box Board Chips	18.00—
No. 1 Mixed Paper	16.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.....	5.05—
Ground, cwt.....	4.30—
Powdered, cwt.	5.20—
Blanc Fixe—	
Pulp, bulk, ton ....105.00—	
Dry, barrels .....110.00—	
Bleaching Powder—	
Drums, cwt	5.02 to 6.50
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	31.50 to 33.00
Argentine, lb.	31.00 to 32.00
China Clay—	
Domestic Filler	
Bulk (mine) ton.....	10.00 to 13.00
Domestic Coating	
Bulk (mine) ton....	17.00 to 25.00
Imported (ship side)	
Bulk (lump) ton...	20.00 to 30.00
Chlorine—	
Tank cars (wks) cwt...	3.05—
Gelatine (silicon), lb. ...	1.25 to 1.35
Glyc. (C.P.) drums, lb.	.30½ to .31
Litharge. Powd. bbl. ...	.17½ to .18
Resin (Gum)—	New York, per 100 lbs.
E	9.55—
F	9.55—
G	9.55—
WW	9.70—
Rosin (Wood), carlots, F.O.B. South	6.50—
Salt Cake—	
Dom. bulk (wks) ton	28.00 to 29.00
Imp. bulks on dock— (Atl. ports) ton (Nom.)	22.00—
Soda Ash—	
Bulk (works) cwt...	1.45—
Paper bags, cwt.....	1.80—
Soda (Caustic)—	
Solid drums, cwt....	4.10 to 4.85
Ground and flake, drums, cwt.	4.50 to 5.25
Sodium Silicate—	
60 deg. 55 gal. drums, (works) cwt.....	1.60 to 1.70
40 deg. 55 gal. drums, (works), cwt.....	1.35 to 1.40
Starch—	
Pearl, 140 lb. bags, cwt.	7.14—
Pearl, barrels, cwt. ..	7.14—
Paper (Sq.) bags, cwt.	7.14—
Powdered, barrels, cwt.	7.35—
Sulphur (Crude) (Mine) bulk, long ton	26.50 to 28.00
Talc—	
Dom. 100 lb. bags (mine) ton	26.00 to 30.00
Canadian	35.00 to 45.00
Titanium Dioxide—	
Barium Pig. bbls., lb.	.24½ to .26½
Calcium Pig, bbls., lb.	.24½ to .26½
Zinc Oxide, bags	14.00 to 15.50

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follows:

Bleached Sulphite ....150.00—	
Bleached Sulphite, Canadian .....150.00—	
Unbleached Sulphite ...125.00—	
Unbleached Sulphite, Canadian .....120.00—	
Bleached Soda .....145.50—	
Bleached Soda, Canadian.142.50—	
Kraft Bleached .....147.00 to 150.00	
Kraft, Bleach., Hardwood .....145.00—	
Kraft, Bleach., Southern.150.00—	
Kraft, Bleach., Canadian.150.00—	
Kraft, Unbleached. Northern .....125.00—	
Kraft, Unbleached, Southern .....112.50 to 120.00	
Kraft, Unbleached, Canadian .....115.00 to 125.00	
Kraft, Semi-Bleached, Southern .....135.00 to 140.00	
Sulphite Screenings .... 72.50—	
Sulphate Screenings .... 67.50—	
Groundwood ..... 80.00 to 85.00	

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish .....150.00—	
Bleached Sulphite, Norwegian, freight allowed.145.00—	
Bleached Sulphite, Finnish, freight allowed.150.00—	
Unbleached Sulphite, Swedish .....130.00—	
Unbleached Sulphite, Finnish, freight allowed .130.00—	
Kraft, Unbleached, Swedish, freight allowed..120.00—	
Kraft, Unbleached, Finnish, freight allow...120.00 to 150.00	
Kraft, Bleached, Swedish, on dock....150.00—	
Kraft, Bleached, Norwegian .....150.00—	

PAPER

Quotations are mill quotations New York City

Boards—

Prices per ton, delivered in New York, 10 tons or more:

Plain chip .....100.00—	
News vat lined chip ..105.00—	
.009 chip, rolls ..... 95.00—	
Filled news ..... 97.50—	
Solid news .....100.00—	
White vat lined chip...135.00—	
Chip tube and can stock.110.00—	
Single manila lined chip.150.00—	
Single jute lined chip..185.00—	
Kraft liner .....130.00 to 140.00	

White patent coated:

.020 .....155.00—	
.018 .....157.50—	
.016 .....160.00—	

Book Paper f.o.b. New York— per cwt.

Machine coated, two sides	
70 lb. No. 2 enamel; 25x 4 cases	$17.25
38-500, trimmed 4 sides. Carloads	$16.30
45 lb. enamel, 25x38-500, 4 cases	$13.05
trimmed 4 sides..... Carloads	$12.10
Uncoated	
55 lb. No. 2 offset, 25x38 4 cases	$14.80
500, trimmed 4 sides.... Carloads	$13.85
50 lb. A Grade English Finish, 25x38-500, un 4 cases	$14.05
trimmed ..... Carloads	$13.10
20 lb. envelope, 17x22-500, untrimmed ..... Carloads	$12.40
16 lb. tablet, 17x22-500 ..... Carloads	$11.35

Rag Content Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

100% rag.....	58.80—
75% rag.....	45.45—
50% rag.....	36.20—
25% rag.....	29.70—

Rag Content Ledger—

(White, 5,000 to 10,000 lbs.)

100% rag.....	58.80—
75% rag.....	45.45—
50% rag.....	36.20—
25% rag.....	29.70—

Sulphite Bond—

(White, 5,000 to 10,000 lbs., basis 16 lb.)

No. 1.....	20.10—
No. 2.....	20.40—
No. 4.....	17.75—

Sulphite Ledger—

(White, 5,000 to 10,000 lbs.)

No. 1.....	20.50—
No. 2.....	19.75—
No. 4.....	18.15—

News delivered in New York— per ton

Rolls, Standard (Contract)	129.00 to 132.00
Rolls (Spot)	(Nominal)
Sheets	140.00—

Tissues (Carlots) f.o.b. New York— per ream

White No. 1	1.90—
White No. 2	1.50—
Bleached Anti-Tarnish..	2.30—
Colored	2.00—
Anti-Tarnish Kraft ..	1.65—
Manila	2.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	1.00—
Napkins, full crepe and embossed (12½ lb. to Mshts.) per cs. ..	1.00—
Toilet, Bleached (M shts.) per cs.....	9.35—
Toilet, Unbleached (M shts.) per cs. ..	7.90—

Towels f.o.b. New York— per case

Bleached	6.80—
Unbleached	5.90—

Wrappings (Kraft) f.o.b. New York— (Basis 50 lb. & heavier) per cwt.

Standard wrapping	8.50—
Butchers, counter rolls..	8.75—
Standard bag, mill rolls.	8.00—
Shipping sack, mill rolls.	8.25—
Gumming, mill rolls....	8.50—
Asphalting, mill rolls...	8.25—
Envelope, mill rolls....	9.75—

NEW LITERATURE

Books

EXPORT YEARBOOK OF THE PAPER AND PRINTING MACHINE INDUSTRY OF WESTERN GERMANY. Published by Export-Verlag Ehle-Hogrebe. Order from German-American Trade Promotion Office, 350 Fifth Ave., New York 1, N. Y., 6 x 8¼. 254 pages. Paper bound. 25c.

This yearbook is a guide to the machines and products made in West Germany for the paper and printing industries. In four languages (English, Spanish, French and German) it presents a complete source of information on purchase of machinery and equipment. The yearbook is arranged according to products: machinery and equipment for the production of pulp, paper and board, converting equipment, printing machinery and used machinery. Exporters and advertisers are listed, and there is a map of the paper and printing machine industry of West Germany. It is thumb-indexed for easy reference.

RANGE MANAGEMENT. Authors, Laurence A. Stoddart & Arthur D. Smith. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. 9¼ x 6¼. 433 pages. $7.00. The American Forestry Series. Second Edition.

Emphasizing methods of increasing production from range lands in terms of meat and wool, this book at the same time stresses the need of intelligent use to conserve the natural range resource to ensure increased production now and in the future.

In reviewing early range history, the book describes the range lands of America and their vegetation. Detailed ecological and physiological relationships of plants are discussed as they relate to grazing. Also included are technical problems of measuring range vegetation, grazing capacity, and condition. Other land products such as timber, game, and water, are dealt with in relation to range management. Problems in livestock poisoning and nutrition are included in a detailed section dealing with livestock management, range improvement, and ranch operation. Eradication of undesirable vegetation and seeding of desirable species to increase production are thoroughly covered.

The considerable information recently made available on nutrition of range forage has also been incorporated in this new edition. Grazing systems, including a summary of the arguments on rotation versus continuous grazing, are analyzed. To make the book more useful as a reference work, extensive citations to other literature are included.

Booklets and Pamphlets

PULPWOOD INDUSTRY FACTS. Published by American Forest Products Industries, Inc., 1816 N Street, N.W., Washington 6, D.C. 8½ x 11. 12 pages. Illustrations, a map, and six tables help make up this booklet on pulpwood industry facts. Included are sections entitled What Pulpwood Is; Pulpwood Production in the United States; The Pulpwood Producing Regions of the United States; The Pulpwood Industry in the United States Economy; Pulpwood Consumption in the United States; The End Products of Pulpwood, and The Pulpwood Supply.

USE OF BLEACHED COLD SODA PULPS FROM CERTAIN MIXTURES OF LATIN-AMERICAN HARDWOODS IN NEWSPRINT (Report No. 2013). By G. H. Chidester and K. J. Brown. Published by U. S. Forest Products Laboratory, Madison 5, Wis. 8 x 10. 16 pages. This report describes newsprint papermaking trials utilizing hardwoods from the Yucatan forests and eucalyptus from Brazil. Material covers a description of wood used in tests, the cold soda pulping process, bleaching experiments, pulp screen classification, and papermaking experiments. Six general conclusions drawn from these tests are listed. Seven tables are included.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.

Engineering Report 6171. Falk Corp., 3001 W. Canal St., Milwaukee 1, Wis. — Engineers and management men responsible for the performance of ball mills, rod mills, kilns, or other machines employing large ring gears will be interested in this report which is published as a sequel to Report 6170. The new report describes the science of producing large ring gears, from the pouring of the castings to the final contact check.

Anti-Corrosive Water Treatment. Permutit Co., Dept. PI, 330 W. 42nd St., New York 36, N. Y. — A new catalogue sheet, No. CS-101, details a new service which stops corrosion of drinking water lines and thus reduces maintenance and replacement costs. This service consists of treating incoming water supplies with minute dosages of chemicals which are non-injurious to health and are effective corrosion inhibitants.

Pipeline Traps. Eriez Mfg. Co., Dept. PI, Erie, Pa. — Bulletin B-605, a 4-page, 2-color brochure describes some newly designed magnetic pipeline traps which, according to the manufacturer, assure product purity, reduce damage and maintenance to filters, mixers and pumps, and eliminate clog-ups and production slow-downs. This bulletin gives construction information, dimensions, and installation instructions by means of pictures, charts, and drawings.

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The N. P. BOWSHER Co., South Bend, Ind.

Rubber Products. Thermoid Co., Dept. PI, Trenton, N. J. — Specifications and descriptions of 68 different rubber hoses for every industrial and agricultural use are presented in the new 8-page catalogue digest, form 3765-R. In addition, this brochure contains data on nine types of conveyor belts, seven types of flat power transmission belting, multiple and fractional horsepower V-belts, chute lining, rubber sheet packing and industrial friction materials. Twenty-three cutaway photographs show hose, coupling and belt construction.

Composite Metal. Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill. — This 4-page leaflet describes Hortonclad, a composite metal having an integral and continuous bond, produced by a new high vacuum blazing process.

Jeffrey Products. Jeffrey Mfg. Co., Dept. PI, Columbus 16, Ohio — Booklet No. 888, formerly "What We Make", has been brought up-to-date and now shows the various material handling and processing equipment products manufactured by Jeffrey Co. with illustrations and a small resume for each product.

Engineering Construction Services. Blaw-Knox Co., Dept. PI, Farmers Bank Bldg., Pittsburgh, Pa. — Six-page bulletin No. 2505 explains engineering and construction services available through the Blaw-Knox Chemical Plants Division from surveys to initial operation of process plants.

Speed Changer. Allis-Chalmers Mfg. Co., 991 S. 70th St., Dept. PI, Milwaukee, Wis. — Operating advantages of "Vari-Pitch" speed changers are described in this 6-page Bulletin 20B6013D, entitled "Texrope Drive Speed Changers." Included are arrangement diagrams, a selection table showing recommended unit size for standard motors, and a speed range table.

Manufacturing Precision Gearing and Complete Power Transmission Mechanisms. Foote Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago 9, Ill. — This Bulletin of 24 pages entitled "Facilities", is intended to acquaint you with the types and capacities of the equipment the company has available for the production of complete units or components.

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Texas Gulf Sulphur Co.

United States Movidyn Corp. 1034

Valley Iron Works Company
Vapo Systems Co., Inc. 1057

Weyerhaeuser Timber Co. 1041
Whiting Corporation 1st Cover
Williams-Gray Company
Wisconsin Wire Works
Worthington Corporation

Yarnall-Waring Company
Youngstown Welding & Engineering Company, The 1042

Professional & Business Service Section
Sirrine Company, J. E. 1064

Cost Comparison of Batch- and Continuously-made Pulps

According to Westvaco's estimates, continuously made pulp is produced at about 30 per cent the cost of a fully cooked chemical product, with steam requirements amounting to about 2000 lbs. per ton of pulp. Other reports show a steam consumption of 1600 lbs. per ton of continuously-made pulp. The variation in steam consumption is explained by the variation in maximum temperatures of the cook, considerably less steam being required at lower maximum cooking temperatures.

Magnetic Clarifier for Waste Water Clarification

A 30-40 per cent BOD reduction is achieved in the Black-Clawson magnetic clarifier. Contaminated water from the paper mill is pumped to a small mixing tank, where specified quantities of iron oxide, ferrous sulfate, and lime slurry are mixed into it. Flocculation takes place in a 5-min. detention tank. The solids and fibers which cling to the iron oxide are then deposited on a revolving magnetic drum, from which they are removed by a doctor blade and then accumulated. 60-70 per cent of the BOD, of course, is in actual solution and cannot be removed by a clarifier.

Metallized Paper Capacitors

The U. S. Signal Corps reports that zinc metallized paper capacitors are far superior to those metallized with aluminum. Temperature characteristics of metallized paper capacitors were found to be equivalent to those of foil capacitors. Life tests made at 85° C and 1.5 times rated voltage showed that the paper capacitors were still functioning satisfactorily after 1000 hours.

Why Alkylketene Dimers Serve as Effective Water Barriers

The chemically combining size, such as the series of alkylketene dimers, owes its reactivity to the presence of lactone groups. These react chemically with the hydroxyl groups of the cellulose fibers, thus making the alkylketene dimer an integral part of the cellulose. The long chain alkyls are then oriented away from the fibers and, due to their hydrophobic nature, produce an effective water barrier.

Heartwood is Penetrated With Difficulty by a Pulping Liquor

Heartwood can be at least 1000 times more difficult to penetrate by pulping liquor than sapwood. It is believed that this is due to the presence of membranes which are formed and which plug the vessels of the heartwood. It has also been observed that plugging of vessels is associated with the presence of a certain strain of micro-organisms.

Newsprint From Waste Paper

While the manufacture of newsprint from waste paper is still at an experimental stage, technical interest in this direction is growing. According to Richard Scudder, publisher of The Newark News, an experimental process developed by the company provides a satisfactory sheet of newsprint from waste paper.

• We've been through a lot of mills (paper mills, that is) —worked with them in running comparative, competitive tests in FLOTATION TYPE SAVEALLS. That's why we know we're on solid ground when we make this statement:

*** In the great majority of cases, one of DARLING'S specifically-formulated GLUES will reduce costs, while maintaining or improving flocculating efficiency.**

We'd like to work with you in making just such a test in your mill. The entire cost is on us. You've nothing to lose... plenty to gain. You can make arrangements through your Darling sales representative. Or write or call us collect.

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• *You can get the same cost advantages from* DARLING'S *specifically-formulated* GLUE *used as an additive for improved* RETENTION!

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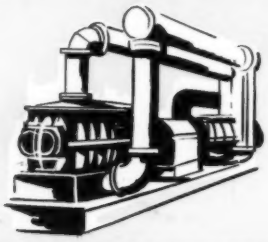
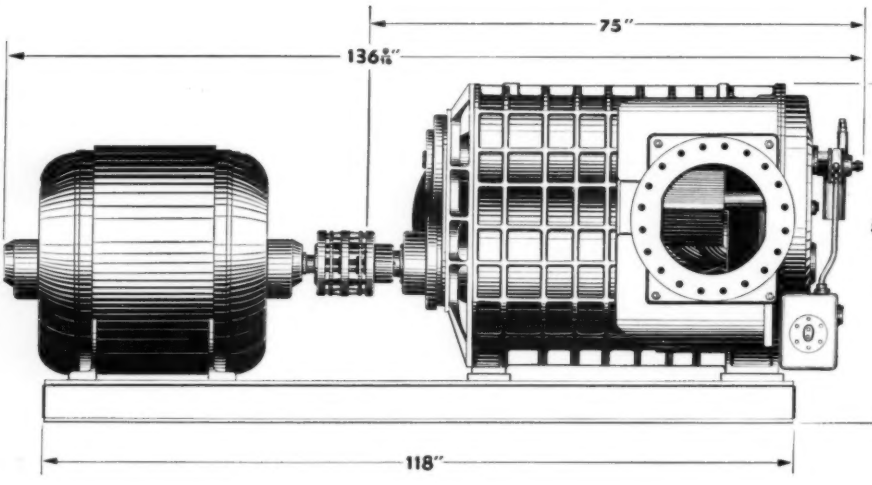
Vacuum Pump Users:

why use two-





400 HP motor
1200 RPM

Standardaire 175x32 Vacuum Pump
75 inches in length, weighs approximately 8,000 lbs.

WHEN ONE WILL DO!

A *Standardaire* Vacuum Pump with low horsepower and single-stage simplicity will do the same job for you as most double-stage pumps . . . at less cost.

For example, the *Standardaire* 175x32 Single-stage Vacuum Pump operating at 1200 RPM is conservatively within the range of a 400 HP motor and gives the following tested CFM capacities—

20" HG	*22" HG*	*24" HG*
8,800 CFM	8,600 CFM	8,300 CFM

Figure what this means to you in savings. You can cut production costs, and save on floor space, too. This is possible because the rugged, compact *Standardaire* offers you greater capacity per pound of pump with less horsepower consumption.

Should you wish to stage two *Standardaires*, the same high capacities are achieved with approximately 25% saving in horsepower.

What's the secret behind the *Standardaire* capacities? Simple, rugged construction and *Standardaire's* exclusive, cycloidal screw-type rotors which compress air in a wide range of pressures with a minimum of internal leakage.

The *Standardaire* is essentially a dry-type vacuum pump, using a very small quantity of water for temperature control.

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